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TRANSACTIONS

OF THE

National Dental Association

AT THE

FOURTEENTH ANNUAL MEETING

HELD AT

Denver, Colo., July 19–22, 1910

AND OF THE

Southern Branch

AT THE

THIRTEENTH ANNUAL MEETING

HELD AT

Houston, Texas, May 4–6, 1910

PHILADELPHIA
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PRESENTED TO THE COLLEGE OF
DENTAL AND ORAL SURGERY OF
NEW YORK BY THE DEAN
WILLIAM CARR, M.D. D.D.S.

FOURTEENTH ANNUAL MEETING

OF THE

National Dental Association,

HELD AT

DENVER, COLO., JULY 19—22, 1910.

TUESDAY—First General Session.

The first general session of the fourteenth annual meeting of the National Dental Association was called to order at 10.30 o'clock Tuesday morning, July 19th, in the Auditorium, Denver, Colo., by the president, Dr. Burton Lee Thorpe, St. Louis, Mo.

The President introduced the Rev. A. H. Fish, pastor of the Central Presbyterian Church of Denver, who invoked the divine blessing on the deliberations of the association.

Dr. H. J. Burkhart, chairman of the Executive Council, announced as the program for the first general session, addresses of welcome by Hon. John S. Irby, Denver, and Dr. E. R. Warner, Denver, and response by Dr. B. Holly Smith, Baltimore; these to be followed by the President's address, and that to be followed by a paper by Dr. C. C. Allen, Kansas City. Dr. Burkhart announced that Section II would meet in the afternoon at 2.30, when papers would be presented from Dr. J. V. Conzett, Dubuque, Iowa, and Dr. D. Stern, Cincinnati, Ohio. The program for the evening session would be announced later in the day. The paper for the general session on Wednesday at noon would be that by Dr. J. Leon Williams, London, Eng.

The president, Dr. Thorpe, then introduced the Hon. John S. Irby of Denver, representative of the mayor, who made the following address of welcome:

Welcome from the City of Denver.

Mr. President, and gentlemen of the National Dental Association,—It gives me pleasure to extend to you a "welcome" to Denver—a city which makes that pleasant word full of meaning and reality. No

one regrets the absence of the mayor more than I; I am as the shadow representing the substance! I am sorry that you are not welcomed to Denver by the man who is building it; by the man who is spending his days and his nights in an effort to make the city he loves a more beautiful and a better place in which to live. I am sorry on his account that he is denied the privilege of extending a greeting to this splendid body of men and women. His pride in Denver would have clothed that duty with an unction and a zest. But, ladies and gentlemen, his loss is my gain. This is the happiest moment of my life!—I have waited a long time for this golden opportunity. I have suffered much at your hands and from the tortures inflicted by your instruments. It has been a long lane, but it has turned at last. Byron, in his "Mazeppa," said:

> And if we do but wait the hour,
> There never yet was human power,
> Which could evade, if unforgiven,
> The patient search and vigils long
> Of him who treasures up a wrong.

Now it is my turn!—at last I have you in the chair, and if I bore you for an hour on the subject of the tariff or any other old subject, it will be a slight punishment compared with the boring I have had to endure from the dental engine. Now, of course, I *could* pull it out with one jerk, and have the agony over, but I prefer to take lots of time, and kill the nerve—I have no other appointment for the day except with you.

As a politician I am delighted to welcome the men with the "pull," the men to whom we show our teeth in a purely friendly spirit, all unconscious of our fate, as the flower that opens its heart to the bee bearing the pollen on its wings.

That portion of our anatomy which is the subject of your skill and solicitude causes us trouble from the very inception of life. It brings us pain, even in our swaddling-clothes. Adam and Eve had much to be grateful for because they escaped teething. I know of no one thing which unfits a man for citizenship like the toothache. It was the thing which first brought about my early conclusion that life was not worth living. On the plantation in Virginia where I was born, the only sufficient excuse for drunkenness among the negroes was the toothache. The method of pulling teeth in those days, while more unique than that now employed, was just as effective. The oldest and wisest of the blacks upon the plantation would tie a string to the tooth, fastening the other end to a bedstead, then seizing a chunk of burning wood from the fire-place, would thrust it suddenly in the direction of the face of the patient, who, to avoid the fire, would jerk his head back, and out would come the tooth. There was a superstitious belief among the negroes that if the patient thus pulled his own tooth, there was less liability of evil consequences.

While the toothache was a sufficient excuse among the negroes for drunkenness on the plantation, they would have to make good by having the tooth extracted, either during the spree or afterward. I remember one old negro, who had been sober for so long that I said to him, "Uncle, what is the matter, that you haven't been drunk for so long—have you reformed?" "No, massa, no," he said, "I ain't reformed, but I ain't got but two teeth left, and I'm savin' dem fer Christmas."

Ladies and gentlemen, we are delighted to have you in Denver; the chiefest city of the land of sunshine and desert, of rocks and gold, of sun-capped

peaks, of myriad-colored cañons, of ever-changing and never-ending grandeur. Fill deep your lungs with our life-giving ozone. Climb to our jutting crags or flick a fly over some of the five thousand miles of our trout streams; then come back to Denver, the city of light and broad boulevards, of clean streets, of cozy homes, of sincere, broad-minded people —and you will be so absorbed with the joy of living that you will have no time to find fault with your neighbor—and no time to dwell upon the vagaries of the muckrakers. I thank you.

The PRESIDENT. I now have the pleasure of presenting to you a gentleman who is largely responsible for the success of this meeting—who, I might say, is the instigator of it, and whose days of most assiduous work, combined with his executive ability as an organizer, has perfected what I hope will be the best meeting of the National Dental Association ever held.

It is my pleasure to introduce Dr. EUGENE R. WARNER of Denver with a

Welcome from the Profession.

Mr. President, ladies and gentlemen, —I am sorry that the Governor is not here to give you an address upon the resources of Colorado, and I was rather fearful that Colonel Irby would consume that hour and a half in elaborating upon the history of dentistry as revealed to him; but I am pleased to be before you —not that I choose to speak individually, but as in behalf of the dentists of Colorado, welcoming the profession to this city, which we look upon as a fair one and as a representative of what the West will be in the years to come. I regret exceedingly that the heat has been sufficient to cause many of you that unpleasant sensation of discomfort, but it has dawned upon me that Providence has recognized this great crusade for better teeth and better health in our community and in the country generally, and as better mastication induces better assimilation, which in turn brings better health to the individual, and as heat is one of the best of germicides, has concentrated the rays of the sun upon us at this time. If it brings you distress, keep upon the shady side of the street, and if you cannot even then escape the consequences, just lay it upon the altitude, which is our common way of getting out of trouble.

I am not going to elaborate upon what our committee has done. I would take exception to the statement just made by your president, for the whole local committee is responsible for what has been accomplished. I will say that the dentists of Denver and of the state have joined forces to make this meeting a success. It is through the energetic efforts of the chairmen of the different committees—the combined efforts of all of them—that are brought about such results as we hope to obtain.

We have planned for your entertainment a few things which I hope will bring to you a realization of what it means for you to be with us in this city; but it has been the desire of the officials of this society to make this meeting a matter of business first and pleasure afterward, and we have adhered to that plan.

There will be, on Tuesday and Thursday evenings, section work in the theater portion of the Auditorium. Wednesday evening is the great "Oral Hygiene" evening, devoted to the interests of the general public. On Thursday afternoon, at one o'clock, there will be a complimentary luncheon to the visiting

ladies at the El Jebel Temple. On Friday evening we shall take a night off, and go by trolley from the Brown Hotel to Lakeside, one of our summer-outing places, where you will all be admitted to the grounds and allowed to go at your own free will, doing the various stunts.

For Saturday morning the local committee of arrangements has planned a complimentary trip to all the visiting dentists and their ladies to Glacier Lake over the "Switzerland Trail," above the city of Boulder, leaving here about 8 A.M. and returning about 6 P.M., having a picnic luncheon at the Glacier Lake. I am sure you will enjoy that very much.

For Sunday a special train has been provided at special rates for a trip to Mt. McClellan over the Colorado and Southern Railway, above the Georgetown Loop, which will take you to an elevation of 14,000 feet, the highest point reached by a railroad in the world.

I assure you that any local man in Denver of whom you may specially seek some information, if he is not in a position to give it you directly, will tell you where to obtain it; if he does not, we shall try to ostracize him!

I thank you for the privilege of speaking to this audience, and assure you that we welcome you one and all to our city and state.

Response to Addresses of Welcome.

To these addresses of welcome, Dr. B. HOLLY SMITH of Baltimore, Md., responded as follows:

Mr. President, representatives of the State Government of Colorado and the City of Denver, ladies and gentlemen,—It is a beautiful thought that, stamped upon "old glory," the flag of our nation, is a star for every state in the Union, and wherever that banner is unfurled to the air the American citizen is at home. I stand here today to respond to your words of greeting and welcome, as the representative of the National Dental Association of America, an association whose membership is made up of men from every state and territory of our country. Our pilgrimage to you is but a home-coming—it is but a visit to a part of our domain with which we want to familiarize ourselves, and which we would cultivate into even greater usefulness to humanity.

This is the first time that our meeting has been held so far west, but the association is as much western as it is eastern, and indeed, in the flush of your cordiality, I am disposed to wish it more western than anything else. So far as I am concerned, I could almost wish that it were with this pilgrimage as it was in the South in the good old times "befo' de wah," when friends would drop in for a little visit, and days would lengthen into weeks, weeks into months, and months sometimes into seasons or even years, with still no occasion to speed the parting guest.

Your local committee knows how greedily we accepted your cordial invitation to come to Denver, but none of you can know how anxiously we waited for this hour, the time when we should really be here. I say "we," meaning what is left of us—for some who, like us, looked forward gladly to this occasion, have since gone into a farther country, and we mourn their absence. But here we are, some of us higher up than in our modest moments we ever expected to be—transported, as it were, by your cordial words of welcome into the seventh heaven of contentment and joy.

We come to you bringing the record of

our past achievements, an honorable record, contributing to the upbuilding of a great profession devoted to the amelioration of human suffering and the uplift of our brother man. We come to enact in your midst and partly for your edification the deeds of the hour and the day, the natural consequences of the labor of those who have gone before, and of those who have worked and waited. We come to say, perhaps not the final word on anything, but the most hopeful and helpful word that has yet been uttered. We come with minds alert, with open hearts, thrilled by your oratory, melted by your cordial welcome.

We of the South are not unmindful that it was W. G. Russell of Georgia whose pick first turned up to the light of heaven that "saint-seducing gold" that has helped to make Colorado famous. We of the East know that in the beginning of this great state our representatives were here in the forefront of every contest. Indeed, from whatever section we come, we all have a special interest at stake here in Colorado. The entire country has had its eyes focused upon you while the struggle for supremacy was going on between the public service corporations and corrupt politics on the one side, and the people on the other. In the last engagement the people, led by that doughty little fighter, Judge Lindsay, seem to have had the advantage.

One battle does not decide the war, of course—indeed it bids fair to be a long and bitter one; but soon not only Colorado but all the states will be engaged in the same fight, and it will be a fight to the finish. Its duration cannot accurately be foreseen, but no one can fail to see to which side ultimate victory will come. Denver may be slightly inconvenienced now by shortage in her water supply, but this momentary annoyance will pass and all things belonging to the great city of Walt Whitman's dream will yet be here:

The place where a GREAT CITY stands is not the place of stretched wharves, docks, manufactures, deposits of produce merely,
Nor the place of ceaseless salutes of newcomers or the anchor-lifters of the departing,
Nor the place of the tallest and costliest buildings, or shops selling goods from the rest of the earth,
Nor the place where money is plentiest,
Nor the place of most numerous population.

Where the city stands with the brawniest breed of orators and bards,
Where the city stands that is beloved by these and loves them in return and understands them,
Where children are taught to be laws to themselves, and to depend on themselves,
Where equanimity is illustrated in affairs,
Where speculations on the soul are encouraged,
Where women walk in public processions in the streets the same as men.
Where they enter the public assembly and take places the same as men,
Where the city of the faithfullest friends stands,
Where the city of the cleanliness of the sexes stands,
Where the city of the healthiest fathers stands,
Where the city of the best-bodied mothers stands,—
There the GREAT CITY stands.

We thank you for this cordial welcome to your great state and city.

Dr. W. T. Chambers of Denver, vice-president from the West, was then called to take the chair.

Dr. CHAMBERS. The next order of business is the reading of the President's address. It is with great pleasure that I present to you our president, Dr. BURTON LEE THORPE of St. Louis.

Dr. Thorpe then read his address. (See page 24.)

Chairman CHAMBERS appointed as the Committee on the President's Address Drs. Edward C. Kirk of Philadelphia, Richard Summa of St. Louis, and J. G. Fife of Dallas, Texas.

The PRESIDENT. Dr. C. C. Allen of Kansas City was to be present at this session and present a paper on "Professional Opportunity." This paper will be presented and read by Dr. J. D. Patterson, on account of the enforced absence of Dr. Allen, who on last Wednesday was operated upon for appendicitis, and has since been in a critical condition in the hospital. As a compliment to my friend Dr. Allen, I have requested the Executive Council to allow his paper to be read at this time, with the consent of Chairman Barber of Section II. I now present Dr. J. D. Patterson of Kansas City, who will read Dr. Allen's paper.

Dr. Patterson then read the paper by Dr. CHAS. CHANNING ALLEN of Kansas City, viz, "Professional Opportunity." (See page 30.)

The F. D. I. Miller Memorial.

The PRESIDENT. The chair now recognizes Dr. Truman W. Brophy of Chicago, who desires to make a statement concerning the Miller memorial.

Dr. TRUMAN W. BROPHY. The president has taken me somewhat by surprise by asking me to come to the platform at this time. I must say now what I desired to say at this convention, namely, that the members of the dental profession of the United States have seen fit to join in a great international movement which was inaugurated two years ago by the International Dental Federation (Group I), in session in Europe, for the purpose of establishing a permanent memorial to the memory of the late Dr. Willoughby D. Miller, late dean of the Dental Department of the University of Michigan. It is well known that Dr. Miller was an indefatigable worker along dental lines, and did more, perhaps, in his time to place our profession on a scientific foundation before the world than any other one man. Dr. Miller, as you know, closed his life before his work in assuming the deanship of the institution named was really begun.

The fund that is being collected for this memorial has already grown to about $12,000. It is intended, as you doubtless know, to make use of the interest on this fund to assist in carrying on scientific work along the lines that he pursued.

As the president informed you in his address, the first prize awarded by the members of the committee, made up of members of the dental profession representing all countries holding membership in the International Dental Federation, was awarded to the distinguished American, Dr. G. V. Black of Chicago.

America has not done her part in subscribing to this fund, as we have less than $2000 in the general treasury. The state of New York has taken the lead. When called upon they agreed to raise $1000, and actually raised $1100, the money having been paid in. Illinois has raised $1000, and we hope to have the fund raised to at least $5000. The president has permitted me to come before you to say that we wish to make up at least $2500 in this meeting of the association before it adjourns. I cannot see how any man who has had the benefit of

Dr. Miller's teaching, who has learned through his work the real origin of caries of the teeth, can afford to permit this fund to be finally closed without making some kind of a contribution. I trust that these good people of the central West who have not up to the present time made contributions will come forward and make a liberal subscription to this fund, not only individually, but from their state societies. Let us do this for the greatest scientist the dental profession has ever developed. His remains lie in the state of Ohio, but his fame is the world's treasure.

Dr. F. O. Hetrick, chairman of the Clinic Committee, announced the order of clinics for Wednesday morning.

The general session then adjourned until Wednesday at 12 o'clock noon.

WEDNESDAY—Second Session.

The general session was called to order by the president, Dr. Thorpe, at 12 M. on Wednesday, July 20th.

Dr. H. J. Burkhart, chairman of the Executive Council, made the announcements for the order of the day's proceedings.

Dr. Burkhart also presented a report from the Executive Council, and moved its adoption. [For Minutes of Executive Council see page 14.]

The motion was duly seconded, and was carried unanimously.

Dr. E. R. Warner, chairman of the Local Committee, then made the announcements of the time and place for taking the official photograph, and also as to matters of entertainment during the meeting.

Dr. F. O. Hetrick, chairman of the Clinic Committee, announced the program for the day's clinics.

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

Dr. Edward C. Kirk, chairman of the Committee on the President's Address, then presented the committee's report. As Dr. Kirk was suffering from throat trouble, the report was read by Dr. J. D. Patterson, as follows:

Mr. President and Gentlemen,—Your committee appointed to consider and report upon the President's annual address respectfully presents the following as the result of its deliberations:

We sympathetically join in the recommendation of the President that fitting recognition be made by the National Dental Association of the loss which that body has sustained by the death of one of its most eminent members, the late James Young Crawford, M.D., D.D.S., of Nashville, Tenn., and we recommend that the Committee on Necrology, or another appropriate committee, be instructed to prepare suitable resolutions expressing the high regard and appreciation which this association has always felt for Dr. Crawford, our feeling of sorrow at the loss we have sustained by his death, and our sympathy with the surviving members of his

family in their bereavement; and that the report of the Committee on Necrology be presented for formal adoption by this association before the close of the present meeting.

We heartily commend that portion of the President's address which directs our attention to the present as being the golden anniversary of the organization of the American Dental Association, the representative of the principles and purposes which have been directly and continuously transmitted to our present representative national body, its successor, and directing our attention to the advances which have taken place within that period. We believe that the several marked advances noted by the president as having occurred during the organized life-time of this association are justly attributable in no small degree to the influence which this association has exerted.

Your committee joins with the president in expressing its gratification at the tribute of appreciation which the dental profession of Europe has paid to American dentistry by conferring the first W. D. Miller prize upon our distinguished colleague, Dr. G. V. Black of Chicago, and by the erection of a bronze monument to Horace Wells of Hartford, Conn., the discoverer of surgical anesthesia, and we recommend that suitable resolutions expressive of our appreciation of these marks of approval of the work of these eminent American dentists be forwarded to the secretary of the International Dental Federation and the secretary of the National Dental Association of France respectively.

The recommendations made by the president with respect to the two movements, one international and the other national, having for their common object the honoring of the memory of our most eminent dental scientist, the late Professor Willoughby D. Miller, have the cordial and unanimous indorsement of your committee.

Your committee is in hearty sympathy and accord with the position of your president with respect to the fundamental principles upon which dental education rests, has rested, and should rest—principles which have their foundation in the purpose intended by the founders of this organization, and which the president defines to be "The education of practitioners in the science and art of the conservation, treatment, and repair of the human teeth and their dependent structures, viz, the jaws, pericemental membranes, and gum tissues." We are further in accord with the view expressed in the following quotation from the President's address: "By no means is our present system of dental education perfect, for no education ever was, nor ever will be perfect, but we are headed in the right direction, and a constant furtherance along the present lines will result in the best possible achievement."

We are in agreement with the truth of his statement that "before medical men can undertake to instruct dentists, they have much to learn," and your committee believes that the "much to learn" here referred to must embrace no less than all that is comprised in what we today classify as the science and art of dentistry. It is the belief of your committee that it is of infinitely more importance for the welfare of humanity today that the medical profession should be well instructed in the main features of dental science, rather than that the dental practitioner should acquire the knowledge of those subjects constituting the medical curriculum, which would fit him to receive the medical degree.

Your committee feels that the references made in the President's address to the stomatological movement are both timely and pertinent. Your committee deems it to be regrettable in the extreme that there have arisen within the ranks of those who practice our specialty a proportion of its members who in their apparent over-enthusiasm to enlarge the field of dental activities by creating a new type of practitioner designated as the stomatologist, feel that they have such justification for destructive criticism of the educational methods and attainments of the dental specialty as to constitute them what the president has fairly designated "the detractors of our calling."

Your committee believes and fully concedes that honest difference of opinion and belief may exist with reference to methods of dental education, but it is in hearty accord with the president in placing the seal of condemnation upon that type of criticism manifested within our own ranks which distorts the facts involved, which is a perversion of the truth, and which your committee honestly believes is the major symptom of a lack of re-

spect for our calling colored by a disappointed social or professional ambition.

Your committee interprets the spirit of the President's address with respect to this general question to mean that this association should regard the profession of dentistry as a special department of the science and art of healing, that its achievement in all of its phases during the seventy years of its organized existence has been attained as the result of adherence to the policy of its founders, viz. Horace H. Hayden and Chapin A. Harris, and that its most hopeful avenue of future development must be along the lines of strict adherence to the same fundamental ideas; that the dental profession must purge itself of the false and misleading notion that it can attain to greater eminence or usefulness to humanity by an organic merger with the medical profession through the avenues of the medical curriculum and the attainment of the medical degree.

Your committee fails to see any justification whatever for the existence of a specialty of medicine to be designated as stomatology, constructed at least along the educational lines thus far proposed, for the reason that everything which may be legitimately included in the specialty dealing with the oral cavity and its contained tissues naturally falls within the sphere of study and practice now constituting the field of the dental practitioner. The logical line of advancement, therefore, is to enlarge and improve the special dental curriculum so that it shall be inclusive of the training necessary to adequately deal with the problems involved in the pathology of the mouth, rather than to create a new specialty in medicine, to which these same problems bear but a relatively remote relation.

In view of the general agitation of this matter, it appears to your committee to be an opportune occasion for the National Dental Association to place itself clearly on record before the world as to its position in regard to this important question, and to give its moral support and aid to those organized bodies of our profession throughout the world who in their various localities are at present contending with the activities of the stomatological fetish. We should thus stimulate among those who are the holders of the dental degree a genuine respect for their attainment, and help to neutralize the false notion which has been disseminated that professional or social respectability is an essential factor of the medical degree or of any other degree.

Your committee cordially approves of the references made by the president to the educational needs of our profession. It must be generally evident that an awakening is taking place in educational circles in all departments throughout our country. The factor of illiteracy in any nation is a condition of vast economic importance, which affects the welfare of a people so directly that all governments are vitally concerned in the question of education in every department of human inquiry. It is manifestly true that in the special department of education with which we are immediately concerned there is crying need for reform. Much has been accomplished in the past through the combined agency of the National Dental Association and its outgrowths, the Dental Faculties and the National Association of Dental Examiners. These co-operative influences have served to modify the primitive conditions which existed in the period of our professional organization, and have passed to the point where in many ways we have realized acceptable standards for education in our specialty. Notwithstanding the advances which have been made, there is a widely expressed feeling that the time is ripe for more definite advances.

It is palpable that a considerable proportion of those who are ultimately licensed to practice the profession of dentistry are not educationally equipped as they should be to meet the serious demands for trained judgment and skill which their professional problems impose, as the result of which the public does not in such cases receive the competent care and treatment which it is the intention of the state, expressed in its protective legislation, that the public shall receive. Your president has said that in referring to this question he realizes that he is "touching a nerve acutely sensitive." Your committee, while fully realizing the truth of this, nevertheless feels that the importance of the issues involved is such as to justify us in proceeding with what we should regard as our clear duty to correct such abuses in dental education as lead to the licensing of

incompetent practitioners, and do so in the spirit of the surgeon who would not hesitate to remove a morbid growth in spite of the temporary suffering which the operation might incidentally involve.

With respect to the question of reorganization referred to in the President's address, your committee does not feel that it is sufficiently well informed with regard to the details of the plan, nor as to the results which the proposed plan of reorganization would be likely to achieve if put into effect, to enable it to express an intelligent opinion upon the question under consideration.

Your committee desires, however, to record its opinion that if reorganization of the National Dental Association in its practical operation means mainly a change in political management, as the address intimates, then your committee is in accord with the view of the president that reorganization at this time would be inexpedient. Furthermore, your committee feels that even though the suggested, or some other plan of reorganization be ultimately adopted, it would be wise to carry on the campaign of education with respect to reorganization among the component societies for a further period of time before putting the reorganization plan into effect in our national body. Your committee feels that there is yet much work to be done among those organizations which, under the proposed plan of reorganization, are to ultimately become components of our national body, before that interest in our organization so essential for its successful operation can be secured.

On the whole, and in the light of such information as your committee now possesses with reference to this important matter, we desire to express our general approval of the suggestions embodied in the President's address with respect to this question, and which we interpret as a recommendation to postpone final action upon the reorganization question until a future meeting.

Your committee desires to record its appreciation of the broad-minded and liberal spirit which characterizes the admirable address of our president, and to particularly express its approval of the wise and judicial recommendations which the address contains, and the earnest, loyal devotion to the best interests of dentistry and its official national representative body which is throughout expressed in it.

Respectfully submitted,

EDWARD C. KIRK, *Chairman,*
J. G. FIFE,
RICHARD SUMMA,
Committee.

On motion, duly seconded, the report was adopted.

The CHAIRMAN. I now have great pleasure in presenting to you a distinguished American essayist, a resident of London, England, one of the men who has done such great work along the lines pursued by Miller and Black and Kirk. We are highly honored in having with us as our guest of honor this distinguished gentleman, Dr. J. Leon Williams of London, whom I now present to you. (Applause.)

Dr. WILLIAMS then presented a paper entitled "The Esthetic and Anatomical Basis of Dental Prosthesis." (See page 35.)

The general session then adjourned until 12 o'clock M., Thursday, July 21st.

THURSDAY—Third Session.

The general session was called to order at 12 o'clock noon, on Thursday, July 21st, with the president, Dr. Burton Lee Thorpe, in the chair.

Dr. BURKHART, chairman of the Executive Council, presented a report, which was on motion adopted.

Dr. H. C. FERRIS, Brooklyn, N. Y., chairman of the Committee on Scientific Research, then read the report of that committee. (See page 65.)

There being no discussion, the report was, on motion, received.

Dr. LEVITT E. CUSTER, Dayton, Ohio, was introduced, and read a paper entitled "The Bleaching of Porcelain Fillings." (See page 70.)

The next order of business was the selection of the time and place of the next annual meeting.

Motion was made and carried that the next annual meeting be held on the fourth Tuesday in July 1911.

For the place of the next meeting, Cleveland, Ohio, and Rochester, N. Y., were put in nomination. A ballot was taken and resulted in the selection of Cleveland, Ohio, as the place of the next annual meeting.

ELECTION OF OFFICERS.

The next order of business was the election of officers for the ensuing year, which resulted as follows:

President—E. S. Gaylord, New Haven, Conn.

Vice-president for the East—C. S. Butler, Buffalo, N. Y.

Vice-president for the South—J. W. David, Corsicana, Texas.

Vice-president for the West—E. R. Warner, Denver, Colo.

Corresponding Secretary—C. W. Rodgers, Boston, Mass.

Treasurer—A. R. Melendy, Knoxville, Tenn.

Recording Secretary—H. C. Brown, Columbus, Ohio.

Executive Committee—Louis Meisburger, Buffalo, N. Y.; M. F. Finley, Washington, D. C.; D. M. Gallie, Chicago, Ill.

Executive Council—H. J. Burkhart, Batavia, N. Y.; J. G. Sharp, San Francisco, Cal.; B. Holly Smith, Baltimore, Md.; C. L. Alexander, Charlotte, N. C.; A. H. Peck, Chicago, Ill.

REPORT OF LOCAL COMMITTEE OF ARRANGEMENTS.

Dr. E. R. WARNER, chairman of the Local Committee of Arrangements, presented and read his report, as follows:

It may be interesting to those present at this session to know the number of delegates and others registered. There may be some who have not recorded themselves, but the account kept by the registrar may be considered quite accurate, and the figures are as follows: Dental practitioners, 896; visiting ladies, 236; exhibitors, 74, making a total of 1206.

This list is approximately correct, although there may be a number who did not register, which would swell the total somewhat.

On motion the report was received.

The session then adjourned.

FRIDAY—Fourth Session.

The general session was called to order by the president, at 12 o'clock M., on Friday, July 22d.

The secretary presented and read a report from the Executive Council.

The report was on motion adopted.

The association then proceeded to instal the newly elected officers, who were called to the platform and severally addressed the members present, after the following remarks by Dr. Thorpe:

Dr. BURTON LEE THORPE. The time has come for the installing of the president-elect. In resigning the gavel to him, I desire to express my personal thanks to all the officers and committees and especially to the Local Committee, the Clinic Committee, and the section officers, each of whom have done such noble work in making this meeting a success.

I think it is true that this is one of the best, if not the best meeting the National Dental Association has ever held. We have had registered here nearly one thousand dentists, one hundred exhibitors, and two hundred and fifty ladies. Taking it as a whole, including the one hundred and forty new members whom we have received, it has been one of the best meetings held in the history of the association.

I desire also to extend my personal thanks to Dr. Stanley Rich, for bringing with him this excellent photograph of our beloved friend Dr. J. Y. Crawford. I want to extend my personal thanks for the many courtesies and kindnesses that the members of this association have shown me at this meeting, and in the past. Those of you who have believed in me, who have encouraged me, and inspired my every effort, I thank most heartily. I will now ask Dr. B. Holly Smith and Dr. Melendy to escort the president-elect to the rostrum.

Dr. E. S. GAYLORD of New Haven was then presented to the members, and spoke as follows:

Ladies and gentlemen, members of the National Dental Association,—This is the first time in the past thirty years when I have felt that I had occasion to call in question the action of this body. But I assure you, gentlemen, that in accepting this position, I am not unmindful of the honor which it has been your pleasure to bestow upon me. In the name of my state, I gratefully accept it, and I assure you that during the period of my occupancy of this office, I shall expect and shall insist upon your cordial support.

I also crave your indulgence for whatever mistakes, and very possibly there will be many, I may make, but you can rest assured that whatever I do will be done with a desire to advance the interests of our great profession and humanity.

Dr. C. S. BUTLER, the retiring secretary, was granted the privilege of the floor, and addressed the members as follows:

Mr. President, ladies and gentlemen,—The Executive Council desired me on its behalf to present at this time the

thanks of the association for the splendid work which the officers and committees have done to advance the interests of the association during the past year and in preparation for this meeting, and they desire to thank particularly the Local Committee of Denver.

It has been my privilege for a good many years to have to do with our National meeting, and I think it is not at all invidious for me to say that in all my experience I have never known of more efficient work in the preparation for the meeting. Better team-work there has never been, and all without a discordant note. This is not unusual, perhaps, but I assure you it is very delightful, because you know there are multitudinous arrangements to be made, large numbers of men of judgment and experience to be brought to harmonize.

Personally, I desire to thank our retiring president for the splendid work he has done for this association during the past year. I think I have been in a position to know and to appreciate that work, as we have been in intimate touch during the entire time; and if I were to attempt to express my personal feeling and gratification at this time, I could hardly trust myself to do it in his presence, because there has grown up between us and the other officers of the association and committees a feeling that is more than friendship. It is one of the most precious experiences in my professional life that I can count among my intimate personal friends so many of the splendid men who are members of this association.

Dr. H. C. Brown. I think that we should one and all express our appreciation for the very efficient work of our retiring secretary, and in view of this, I ask the association to extend to him a rising vote of thanks for his efficient services in that capacity.

The motion was regularly seconded, and the Chair calling for a rising vote, it was unanimously carried.

Dr. C. S. Butler. Gentlemen, I thank you for this expression. I move that the President and the Executive Council be empowered to meet at their pleasure for the purpose of appointing the section officers and the usual committees of the association for the ensuing year.

The motion was regularly seconded and carried.

Dr. H. L. Wheeler. There is a little matter I would like to present. I understand that this association has had some trouble to procure a gavel for the president. I would like to make a motion that we present a gavel to each of the ex-presidents of this association, that we may always have one at hand, and that each presiding officer may keep one as a souvenir.

The motion was regularly seconded and carried.

Dr. J. W. David, the vice-president elect from the South, then announced that he would furnish a sufficient number of gavels, made of native Texas wood, suitably mounted, to be given to each of the ex-presidents of the association.

The National Dental Association then adjourned until the next annual meeting.

MINUTES

OF THE

EXECUTIVE COUNCIL.

First Session.

THE meeting was called to order by the chairman, Dr. H. J. Burkhart, in the Auditorium Hall, Denver, Colo., July 19, 1910, at 9 o'clock A.M., with the following members present: Drs. H. J. Burkhart, Burton Lee Thorpe, B. Holly Smith, A. H. Peck, C. L. Alexander, and C. S. Butler.

The action of the president in appointing Drs. J. V. Conzett, Richard Summa, Louis Meisburger, A. R. Melendy, and H. E. Roberts members of the National Educational Council was approved.

The program as prepared and distributed by the Program Committee was adopted as the official program of the meeting, and the order for the opening session was made the President's address, this to be followed by the paper of Dr. Charles Channing Allen on "Professional Opportunity." The afternoon session would open with Section II.

The resignations of Drs. J. B. Little, F. E. Ball, G. S. Allen, and J. T. Barker were received and accepted.

Drs. James Truman and W. Storer How were placed on the list of members without dues.

Bills from various officers and committees were received and referred to the Auditing Committee, which were subsequently approved, and ordered paid.

Orders were directed drawn for the salaries of the treasurer and the recording secretary, after which the Council adjourned to 3 o'clock P.M.

Second Session.

The Council convened at 3 P.M., pursuant to adjournment, with all the members present.

The report on Revision of the Constitution and By-laws was taken up, and after a long and full discussion the following was adopted:

RESOLVED, That the Committee on Revision of the Constitution and By-laws be continued, and that Drs. R. Ottolengui and H. C. Brown be added to the committee, and that the committee be directed to request the presidents—or representatives to be appointed by them—of the various state associations, the Facul-

ties Association, the Examiners Association, the Dental Educational Council, and the Dental Faculties Association of American Universities, to attend a conference to be called at the pleasure of the committee for the purpose of considering a constitution and by-laws for this association, and to report thereon at the next annual meeting.

A report from the American Miller Memorial Fund was received, but no action was taken.

The following report on the Pharmacopeial Convention was received and ordered printed in the Transactions:

To the Officers and Members of the National Dental Association:

In June 1906, at the union meeting of the Maryland State Dental Association and the District of Columbia Dental Society, a paper by Edward Hoffmeister of Baltimore, on "Pharmacopeial Revision," contained a suggestion that the National Dental Association consider the advisability of sending delegates to the next convention for revision of the U. S. Pharmacopeia.

A resolution was passed at this union meeting appealing to the National Dental Association to make the application for membership in the U. S. P. convention. As president of the National Dental Association, in 1906, to further the project I wrote to Dr. H. C. Wood, president of the U. S. P. convention, and received such encouragement from Dr. Joseph P. Remington, chairman of the Committee of Revision, who answered the letter for Dr. Wood, that after my recommendations were favorably reported upon by the Committee on the President's Address, I followed up the effort to have delegates admitted to the ninth decennial session of the U. S. P. convention; and I now have the honor to report that, with the support of the officers and the Executive Council, who loyally came to my assistance, and the cordial co-operation of Dr. Murray Galt Motter, secretary of the U. S. P. convention, delegates were appointed and admitted to full membership in the ninth decennial session of the U. S. P. convention, from the National Dental Association.

A clause in the by-laws of the U. S. P. convention provides that only those delegates who attend are considered members of the convention, and they continue as such until their successors are appointed and admitted as delegates to the ensuing convention, and no longer. Drs. Joseph Head and M. F. Finley presented credentials and were given seats in the convention.

In the discussion, before admitting our delegates to membership, it developed that efforts had heretofore been made to have the dental profession represented. A member speaking in our favor argued that never before had an application been made so complete and satisfying in every detail as on this occasion; also, that the attainments of members of the dental profession in special work in materia medica and therapeutics warranted the convention in admitting delegates from the National Dental Association. The new members admitted this year were the Secretary of Agriculture, the Secretary of Commerce and Labor, National Wholesale Druggists' Association, National Dental Association, Association of Official Agricultural Chemists, and Association of National Dairy and Food Departments.

A sense of pride arises in me over the results of these efforts on the part of our association to gain membership in the U. S. P. convention, and my belief is that each recognition of this character places us in a stronger position professionally.

Attached to this is a copy of the articles of incorporation, constitution and by-laws of the U. S. P. convention, and other papers bearing on the work of the convention held in Washington, D. C., May 10, 11, and 12, 1910.

Respectfully submitted,

M. F. FINLEY, *Chairman,*
Committee on U. S. P. Convention.

The following communication was received and the recommendations and resolutions accompanying it were adopted:

BALTIMORE, MD., June 11, 1910.

The District of Columbia Dental Society and the Maryland State Dental Association, in joint meeting assembled, upon authoritative information that the department of Agriculture, upon request from the National Den-

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tal Association, would undertake to analyze all standard dentifrices and mouth-washes now on the market, with an idea of publishing their true value and the justness of their advertised therapeutic claims, hereby request that the National Dental Association pass a set of resolutions covering the necessary steps in calling upon the department of Agriculture, through the bureau of Chemistry, to make the analyses hereinbefore mentioned, in the belief that such results would be of benefit to the profession and the general public as well.

Respectfully submitted through its mover,
M. F. FINLEY.

To the Department of Agriculture, Washington, D. C.

Whereas, The National Dental Association is in session at Denver, Colo., July 19–22, 1910; and

Whereas, It is of the utmost importance to the dental profession and the public at large that there should be full knowledge concerning the real worth and true ingredients of the dentifrices and mouth-washes generally prescribed and used; therefore be it

RESOLVED, That the department of Agriculture at Washington be respectfully requested to undertake the analysis of the generally-used dental preparations, with the purpose of publishing their findings for the guidance and instruction of the dental profession at large; and be it further

RESOLVED, That these resolutions be inscribed on the minutes of the National Dental Association; and be it further

RESOLVED, That the secretary be instructed to forward a copy of these resolutions to the department of Agriculture at Washington, D. C.

(Signed) ————————
President,
Secretary.

The following resolution was adopted:

RESOLVED, That the National Dental Association heartily indorses the object of Senator Owen's bill for a department of Public Health, and that a communication to that effect be sent to Senator Owen and the Senate and House committees to which the bill has been referred.

In the Senate of the United States, on June 16, 1910, Senator Cullom, Illinois, introduced a bill to renew and extend letters patent known as the "Low patent," dated March 15, 1881, which was read twice and referred to the Committee on Patents. The following resolution was offered and unanimously adopted:

RESOLVED, That a committee of five be appointed to look after legislation in Congress which may in any way affect the interests of the people through affecting the dental profession.

The following committee was appointed: Chas. W. Rodgers, chairman, Dorchester, Mass.; Chas. R. E. Koch, Chicago, Ill.; Wm. Carr, New York city; C. N. Johnson, Chicago, Ill., and E. A. Bryant, Washington, D. C.

The Committee on Legislation presented the following report, which on motion was received and the bills accompanying it ordered paid:

REPORT OF THE LEGISLATIVE COMMITTEE.

The chairman called a meeting of the Legislative Committee in May 1909 at Washington, D. C., for the purpose of organizing and mapping out a course of action. It was decided that more effective work could be accomplished by having representatives who resided in Washington.

We therefore selected Drs. E. A. Bryant and Williams Donnally, and authorized Dr. Bryant to take charge of matters pertaining to army dental legislation and Dr. Donnally to concentrate his efforts in behalf of navy dental legislation, neither to interfere with the efforts of the other.

We are able to report that the course pursued has resulted in the Navy department adopting a policy whereby it will advocate before Congress the pending identical bills S. 8154 and H. R. 26,189, the standard of which is substantially the same as Senate act 2355, 59th congress.

We feel that the profession is to be congratulated because of this stand of the Navy department for the three grades of rank for which this association has so long made just and reasonable claims.

It is highly important at this time that the profession heartily indorse this legislation asked for by the Navy department, and use our best efforts to have Congress enact the proposed legislation. Failure to attain all that the Navy department now concedes can only result through the lack of interest and non-support of the profession in assisting the Navy department by harmonious activity. It should be borne in mind that by gaining the Navy department's approval of this bill, with its provision for three grades of rank, we establish a criterion for army dental legislation, and by securing its enactment by Congress we fix a standard for a bill of similar provision for the army.

It is the policy of the government that the same general principles and rules are adopted and pursued in the legislation for all branches of the military service, hence no legislation proposed or enacted for one branch can be without effect for good or evil on that proposed or enacted for the other branches. Therefore the bills proposed should be uniform in such essential particulars as grades of rank, promotions, etc., and should be in conformity with the policies adopted by the departments and the Congress with other professions represented in the military service.

In the judgment of your committee this navy dental bill should be read to the National Dental Association in general session, and a request made for a pledge of hearty cooperation with your committee in its plan and effort to promote its passage by the present Congress.

We recommend and urge that this one opportunity of the year for personal interview with members interested may be utilized in furthering the plans for concentrated effort.

With reference to army dental legislation, the committee can report but little progress.

The President of the United States and the Secretary of War informed your committee that the War department, under the direction of the President, has reduced its estimate for the support of the army to the lowest limits consistent with the maintenance of the army. In fact, the department, in order to meet the President's demands for economy, has been compelled to reduce the authorized strength of the army for the next fiscal year by nearly 8000 men. In view of the necessity for economy and considering the evident unwillingness of the military committees of Congress to take favorable action on any of the many bills before them, together with the adverse conditions as reported by Dr. Bryant, we feel, therefore, that it would be unwise to make further effort to secure army dental legislation from the present Congress.

We further recommend that the Legislative Committee be composed of three members, and that they be instructed to urge before Congress in the future no army bill that does not meet the standards set by the pending Navy department bill.

(Signed) W. H. DeFord.
Charles W. Rodgers.
Charles S. Butler.
W. T. Chambers.
H. C. Brown,
Thomas P. Hinman.

Drs. Wm. Crenshaw, W. H. DeFord, and Charles W. Rodgers were appointed the Legislative Committee for the ensuing year, the expenses of the committee not to exceed $200.

The report of the Journal Committee was presented, as follows:

REPORT OF COMMITTEE ON DENTAL JOURNAL.

Gentlemen,—Pursuant to the vote of the National Dental Association at its last meeting, held at Birmingham, Ala., your Committee on Dental Journal decided, at a meeting held in New York on December 4, 1909, to recommend that we begin the publication of the journal, in accordance with the vote of the association, in October 1910.

Upon further consideration and increased knowledge of the conditions, financial and otherwise, of the National Dental Association, and in view of the present prospect of the postponement of a reorganization, we have decided that it will be unwise to commence the publication of the journal at this date.

We desire further time to secure certain

desirable scientific support, and to complete other details in order to start a journal that will command the products of our best men interested in research and other scientific work. To that end we respectfully request that the matter of the establishment of the journal be deferred until next year, and that the Committee on Dental Journal be continued with the same powers as previously.

We further recommend that a fund be created, to be called the Journal fund; and that one dollar annually from each member's dues be set aside for this purpose.

Respectfully submitted,

D. O. M. LeCron,
J. D. Patterson,
Charles S. Butler,
Wm. B. Dunning,
Herbert L. Wheeler, *Chairman.*

On motion the report was received, the bills ordered paid, and the committee continued for the ensuing year.

Dr. H. C. Ferris presented the report of the Research Committee, which was received, ordered read at the general session, and the bills paid.

Dr. W. G. Ebersole, chairman of Committee on Oral Hygiene, presented the following report:

REPORT OF COMMITTEE ON ORAL HYGIENE.

The Oral Hygiene Committee petitions the honorable Executive Council of the National Dental Association to recommend to the association the indorsement of the work of the Oral Hygiene Committee for the past year, and accept the plans and policies proposed for the future. We especially emphasize the following features:

The establishing of the bureau of Education and Information.

The completion of the work in connection with the experimental class of Marion School, Cleveland, Ohio.

The indorsement of the combining of the oral hygiene working forces of the country under one head, and to have them so organized and their methods so executed that every ounce of energy put forth will bring full value in return.

We recommend that each state organization appoint a committee of five men to act as an auxiliary committee to the committee of the National Dental Association.

And last, but not least, to recommend that this association appropriate a sum of money, as may be available, not to exceed one thousand dollars, to be expended at the discretion of the Executive Council in financing the work of the committee, and sanction the raising from state and local societies and from other sources funds sufficient to build as the present committee has planned.

Most respectfully submitted,

E. P. Dameron,
J. P. Corley,
W. A. White,
W. G. Ebersole, *Chairman.*

After a prolonged discussion, which was participated in by many members, the following was adopted:

The Executive Council recommend—

That the association commend the energy and enthusiasm with which the Committee on Oral Hygiene took up its work, and the results obtained during the past year; however, we would suggest that the scope of the work in the future be conducted along lines and under such rules and regulations as shall be formulated by the committee and approved by the Executive Council.

That the sum of one thousand dollars be appropriated by the association for the work of the committee, if there shall be sufficient funds in the treasury not needed or required for other necessary work, and the same to be expended under the direction and approval of the Executive Council. No funds shall be solicited or received for the work from any sources except state and local dental societies, members of the dental profession, and philanthropists.

Dr. Wilbur T. Litch, chairman, presented the following Necrology report, which was received and ordered printed:

REPORT OF THE COMMITTEE ON NECROLOGY.

The Committee on Necrology reports that since the annual meeting of 1908 four members of the National Dental Association have been removed by death, namely, Dr. Joseph W. Wassall, Dr. Solomon Freeman, Dr. James Young Crawford, and Dr. Milton B. Straight.

Joseph William Wassall, D.D.S., M.D.

JOSEPH WILLIAM WASSALL died September 28, 1909, by drowning, while on a yachting cruise, in Lake Michigan. He was born February 8, 1858, in Blockley, Worcestershire, England. When sixteen years of age he became a dental student in the office of Dr. George O. Howard of Galena, Ill., with whom he remained for two years. In 1876 he entered the dental department of the University of Michigan. After graduation his first field of practice was Darlington, Wis., and subsequently Mineral Point, Wis. In 1881 he removed to Chicago, in which city he speedily secured a large and lucrative practice. Desiring a still more advanced training in the basal principles of general medicine, he matriculated as a student in the Chicago College of Physicians and Surgeons, from which institution he was graduated with the degree of M.D.

Dr. Wassall was a member of the Illinois State Dental Society, the National Dental Association, the Odontological Society, the Chicago-Odontographic, the Chicago Medical Society, and the Delta Sigma Delta Fraternity.

As a practitioner Dr. Wassall had an acknowledged eminence. Far beyond the average in technical skill, accepting every advance with eagerness, ever ready to communicate to others the results of his own observations and experience, upright in character, lovable in personality, doing a man's part in life and bearing himself as a man amid all of life's trials and vicissitudes, our fellow member Joseph William Wassall has left behind him a memory to be treasured and an example to be emulated.

Solomon Freeman, D.D.S.

SOLOMON FREEMAN, New York city, died of double pneumonia, March 30, 1910. He was born November 10, 1862, at Belvidere, N. J.; was graduated at Easton high school, Easton, Pa., June 26, 1879, and from the University of Pennsylvania as a D.D.S. in 1882. He practiced first at Easton, Pa., for a few years, and afterward in New York, for the last seventeen years at 967 Madison ave.

He was a member of the following societies: University of Pennsylvania Alumni, Dental Protective Association, First District Dental Society, New York State Dental Society, National Dental Association, and the New Jersey State Dental Society. He was also a member of Mt. Nebo Lodge, 257 F. & A. M. He leaves a widow, but no children.

James Young Crawford, M.D., D.D.S.

JAMES YOUNG CRAWFORD died at Nashville, Tenn., April 5, 1910, from angina pectoris. He was born near Rogersville, Hawkins co., Tenn., June 2, 1848. His father was the Rev. T. J. Crawford, a prominent minister in the M. E. Church, South.

When but fourteen years of age he enlisted in the Confederate army and served in the commissary department for four years, or until the close of the civil war. He then, under the tutelage of Dr. J. E. Breeding, studied dentistry, and engaged in dental practice in McKenzie, Tenn., until 1879. In that year he removed to Nashville, Tenn., in which city he continued in active dental practice until his career was closed by death.

Dr. Crawford was a graduate of the Medical Department of the University of Tennessee, class of 1881. In 1877 he received the honorary degree of D.D.S. at the first annual commencement of the dental department of the University of Tennessee. In this institution he served in 1878 as demonstrator of operative and mechanical dentistry, and in 1879 by appointment became professor of mechanical and corrective dentistry. From 1883 to 1889 he served as dean of the faculty and professor of operative dentistry. For one session, 1890 to 1891, he was professor of clinical dentistry and oral surgery in the dental department of the Vanderbilt University. In 1905 he was elected president of the faculty and professor of clinical dentistry in the dental department of the University of Tennessee, in which position he continued until his death.

In 1883 Dr. Crawford was president of the Tennessee State Dental Society. From 1891 to 1894 he was president of the Tennessee State Board of Dental Examiners. In 1888

he was elected president of the Southern Dental Association, and for two consecutive years, 1894 and 1895, was elected president of the American Dental Association. In his presidential address in 1895 he strongly urged the union of the Southern Dental Association and the American Dental Association, and was active and influential in effecting their union in the present organization, the National Dental Association.

Dr. Crawford was a member of the committee on organization of the World's Columbian Dental Congress, held at Chicago in 1893, and also of the committee on organization of the Fourth International Dental Congress, held at St. Louis in 1904. He was honorary president of the Jamestown Dental Convention, held in 1907, and as a delegate represented the National Dental Association at the Fifth International Dental Congress, held at Berlin in 1909. He was a member of the National Dental Association, the Nashville Academy of Medicine and Surgery, the Nashville Dental Society, and an honorary member of the Ohio State Dental Society and the St. Louis Society of Dental Science.

The committee on Necrology offer the following resolutions:

Whereas, Death has closed the long, honorable, and distinguished career of Dr. James Young Crawford, who by unanimous election for two consecutive terms filled the office of president of the American Dental Association; therefore be it

Resolved, That by the death of Dr. Crawford the National Dental Association has lost a distinguished and faithful member, and the dental profession a co-worker skilled in its art, learned in its science, and enthusiastic and unwearied in his labors for its advancement; and be it

Resolved, That while not unmindful of the inevitable end of man, the National Dental Association profoundly regrets the close of a life filled with promise of still further years of usefulness to the profession he advanced and adorned, and to this Association, of which he was a member both wise in counsel and steadfast in allegiance; and be it further

Resolved, That in testimony of their high esteem for Dr. Crawford as a man, a citizen, a practitioner, a teacher, and a fellow member, an engrossed copy of these resolutions be transmitted to his surviving family, with the expression of the heartfelt sympathy with them in their great bereavement, of every member of the National Dental Association.

Dr. Milton B. Straight.

Milton B. Straight died June 25, 1910, at 80 West Huron st., Buffalo, N. Y. At the time of his death Dr. Straight was the oldest practitioner in continuous service in western New York, he having commenced the practice of his profession in Buffalo in 1856, where he remained until the time of his death. He was a son of the late Dr. Chester L. Straight, who was himself a dentist and formerly a student of the celebrated Dr. Gardet of New York city. Dr. Straight studied his profession in the office of his father, whom he afterward succeeded in practice.

In 1863 he formed a partnership with the late Dr. A. P. Southwick, which continued for about a year. In 1864 he assisted in the organization of the Buffalo Dental Association, becoming one of its charter members, and remained in active service in the society up to the time of his death. He was also a charter member of the Eighth District Dental Society, organized in 1869, and for sixteen consecutive years served the society as librarian. In 1888 he was elected vice-president, in 1889 president, and subsequently served on the board of censors for a number of years. In all these relations he served the society with rare fidelity and conspicuous ability. He early became a member of the American Dental Association, and subsequently merged his membership, at the time of the reorganization, in the National Dental Association, in which he was an active member at the time of his death.

As a practitioner of dentistry Dr. Straight was a man of high ideals and exceedingly conscientious toward his patients, from whom he exacted absolute fidelity. As an operator he stood among the very best in his profession and never permitted himself to swerve from what he believed to be right. He did much for the advancement of the profession, and was always a friend of the young man who desired to be an honest and clean practitioner.

For many years Dr. Straight was a member of the Academy of Natural Science, serving on the board of governors for a number of terms, and did much for the advancement

REPORT OF THE TREASURER.

1910. RECEIPTS.

July 11th—

Balance on last settlement	$1514.48	
Received—From dues, pages 110 to 119	1985.00	
" " " " 120 " 124	382.00	
		$3881.48

1909. DISBURSEMENTS.

March 30th—		
A. R. Melendy, Treasurer, postage, printing, etc.	$60.00	
C. S. Butler, Secretary, postage, printing, etc.	287.39	
Dental Cosmos, mailing Trans., '08	120.70	
A. R. Melendy, salary for 1909	200.00	
C. S. Butler, salary for 1909	400.00	
H. J. Burkhart, exp. Executive Council	28.00	
H. C. Ferris, exp. Research Committee	39.73	
J. D. Patterson, exp. Revision Committee	17.50	
J. D. Patterson, printing "Mouth and Teeth"	152.00	
Burton Lee Thorpe, Internat'l Congress Committee	27.87	
Wm. Crenshaw, exp. Clinic Committee	27.80	
V. E. Turner, exp. as President	50.00	
Wm. Crenshaw, exp. Legislative Committee	107.35	
May 8th—		
J. P. Corley, exp. Oral Hygiene	19.50	
H. E. Roberts, secretary of Section	5.50	
May 13th—		
Wm. Crenshaw, exp. Clinic Committee	26.45	
July 14th—		
S. S. White Dental Mfg. Co., postage, mailing Trans.	7.20	
July 16th— Brought forward	$1576.99	$3881.48
W. H. DeFord, exp. Legislative Committee	86.50	
September 27th—		
Edw. G. Link, exp. Clinic Committee	9.50	
November 10th—		
C. L. Alexander, exp. Council m't'g Cleveland	60.00	
Burton Lee Thorpe, " " " "	50.60	
W. E. Boardman, " " " "	70.00	
H. J. Burkhart, " " " "	25.50	
Chas. S. Butler, " " " "	26.50	
November 16th—		
Matthews-Northrup Co., printing and postage to date	115.00	
1910—*January 12th—*		
C. S. Butler, printing, express, and stenography	35.50	
Balance *Cosmos* mailing fund, March 24th		$5.51
	$2056.09	$3886.99
Balance incidental funds		$1830.90

SPECIAL FUNDS.

Special funds with interest to July 1910		$4399.87
T. W. Brophy, for Miller Memorial Fund (by order of the Association)	$250.00	
Balance Relief Fund		$4149.87
Special Journal Fund, with interest to July 1910		$733.80
H. L. Wheeler, expense Journal Committee	$297.96	
Balance Journal Fund		$435.84

Respectfully submitted,

A. R. MELENDY, *Treasurer.*

Approved July 19, 1910: { V. H. JACKSON, M. F. FINLEY, *Auditing Committee.*

of the academy. He was also a member and greatly interested in the Buffalo Academy of Fine Arts, being a great lover of art, and as a recreation spending much time with the oils and brushes. He was also interested in music and always patronized the best concerts. Socially he loved the society of cultured men and women, though always modest and retiring to a degree regarding his own merits.

Dr. Straight was a member of the Buffalo Club, the Park Club, and the Oakfield Club. He was well known in Masonic circles, being a member of the Erie Lodge for nearly fifty years.

In 1870 Dr. Straight married Miss Mary Reed, who survives him. They had no children.

A dignified, courteous, and true-hearted gentleman was Dr. Straight, and greatly esteemed by all who had the honor of his personal friendship.

C. S. B.

The interests of the National Educational Council of America were presented by Drs. Pryun, Gray, and Grant, and on motion fifty dollars was appropriated toward the expense of this Council.

The Committee on the President's Address requested permission to withdraw from their report the paragraph relating to the Carnegie Educational Foundation.

After a statement by Dr. Edward C. Kirk, the proceedings were given to the *Dental Cosmos* on the same terms as heretofore.

The report of the Treasurer (see page 21) was received and ordered printed.

The Credentials Committee reported that the following had presented proper credentials and had been admitted to permanent membership in the association:

REPORT OF THE CREDENTIALS COMMITTEE.

R. A. Adams, Denver, Colo.
Wm. Cland Adams, Portland, Oregon.
Guy Franklin Baker, Twin Falls, Idaho.
A. D. Barber, Ogden, Utah.
Geo. L. Bean, San Francisco, Cal.
Wm. W. Belcher, Rochester, N. Y.
Carrie Loy Berthamm, Boise, Idaho.
H. W. Bohn, Reading, Pa.
E. A. Bonar, Clay Center, Kans.
W. A. Brierley, Denver, Colo.
Ira C. Brownlie, Denver, Colo.
H. C. Brock, North Platte, Nebr.
C. L. Brininstool, Rochester, N. Y.
F. D. Burns, Durango, Colo.
Walter J. Burridge, San Francisco, Cal.
A. W. Cate, Boise, Idaho.
Alden Carpenter, West Point, N. Y.
Arthur W. Chance, Portland, Ore.
Wm. H. Delbridge, Greeley, Colo.
Frank A. Dille, Greeley, Colo.
W. B. Dimond, Lamar, Mo.
H. S. Engle, Lineville, Ia.
Charles N. Eddy, Boulder, Colo.
Walter H. Ellis, Buffalo, N. Y.
M. H. English, Wray, Colo.
M. Burton Eshleman, Buffalo, N. Y.
T. G. Ferreby, Humbolt, Ia.
J. W. Fields, McPherson, Kans.
Wm. Fowler, Colorado Springs, Colo.
A. W. Fossom, Aberdeen, S. Dak.
L. E. Ford, Los Angeles, Cal.
Geo. W. Fuller, Des Moines, Ia.
Chas. P. Grosby, St. Louis, Mo.
Edw. E. Haverstick, St. Louis, Mo.
*Edward E. Hall, Columbus, Ohio.
B. H. Harms, Belle Fourche, S. Dak.
H. L. Henry, Ashland, Nebr.
L. D. Hodge, Arkansas City, Kans.
Henry F. Hoffman, Denver, Colo.
E. L. Hogan, Stanwood, Wash.
J. G. Hollingsworth, Kansas City, Mo.
L. E. Hutchinson, Wenatcher, Wash.
J. S. Jackson, Denver, Colo.
Leland D. Jones, San Diego, Cal.
M. Evangeline Jordon, Los Angeles, Cal.
A. H. Ketchum, Denver, Colo.
W. Baxter Keyt, Denver, Colo.
J. Hamilton Landry, New Orleans, La.

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* Joined at Birmingham; name omitted from 1909 list of new members.

Clarence E. Lauderdale, Washington, D. C.
L. G. Lemley, Grinnell, Ia.
E. J. Lenzen, Webster Groves, Mo.
B. E. Livingston, Chaunte, Kans.
S. A. Long, S. McAlester, Okla.
S. Lord, Telluride, Colo.
A. E. Mann, Findlay, Ohio.
Wm. M. Mason, Berkeley, Cal.
A. L. Marks, St. Louis, Mo.
Geo. C. Marlow, Lancaster, Wis.
B. J. Maytum, Paullina, Ia.
Rea P. McGee, Denver, Colo.
Herbert C. Miller, Portland, Ore.
Guy S. Millberry, San Francisco, Cal.
L. D. Mitchell, Arkansas City, Kans.
Alonzo M. Modine, Brooklyn, N. Y.
G. S. Moffatt, Pittsburg, Kans.
Chas. A. Monroe, Boulder, Colo.
H. L. Morehouse, Spokane, Wash.
S. S. Noble, Wichita, Kans.
F. E. O'Connell, Seattle, Wash.
E. A. Owen, Salida, Colo.
Byron W. Palmer, Rochester, N. Y.
C. E. Post, San Francisco, Cal.
H. J. Porter, Cambridge, Nebr.
R. C. Quick, Denver, Colo.
H. H. Redmond, Denver, Colo.
Chester B. Reed, Topeka, Kans.
T. T. Rider, Missoula, Mont.
Ray D. Robinson, Los Angeles, Cal.
Ernest G. Rush, Kansas City, Mo.
Geo. S. Schlegel, Reading, Pa.
Wm. Fuller Sharp, Denver, Colo.
James G. Sharp, San Francisco, Cal.
W. E. Sibley, Los Angeles, Cal.
C. Wesley Siefkin, Rolfe, Ia.
O. H. Simpson, Dodge City, Kans.
V. C. Smedley, Denver, Colo.
Wm. Smedley, Denver, Colo.
Raymond R. Smith, Denver, Colo.
O. L. Smith, Ft. Collins, Colo.
J. S. Solecke, Topeka, Kans.
Wm. F. Spies, Pittsburg, Pa.
Allen H. Suggett, San Francisco, Cal.
H. D. Stamwood, Alamosa, Colo.
C. J. Stansbery, Seattle, Wash.
E. A. Thomas, Red Cloud, Nebr.
E. W. Varley, Pueblo, Colo.
E. R. Vaughan, Denver, Colo.
J. H. Wadell, Denver, Colo.
Clarence Watts, Des Moines, Ia.
Arthur C. Watson, Denver, Colo.
Chas. L. Watson, Mexia, Texas.
A. C. Wherry, Salt Lake, Utah.
S. W. Wherry, Ogden, Utah.
A. L. Whitney, Denver, Colo.
Y. E. Whitmore, Little Rock, Ark.
G. A. Wilkerson, Laveta, Colo.
Geo. Y. Wilson, Colo. Springs, Colo.
G. T. Williams, Seattle, Wash.
J. T. Williams, Denver, Colo.
James W. Winn, Nashville, Tenn.
E. A Womachka, Cleveland, Ohio.

The following presented credentials, but did not signify their intention of becoming permanent members:

Chas. H. Alter, Hilltop, Colo.
J. C. Baldwin, Pensacola, Fla.
Edward E. Belford, Cleveland, Ohio.
S. G. Broadfield, Nowata, Okla.
John P. Buckley, Chicago, Ill.
Isaac Burton, Colo. Springs, Colo.
Willis A. Coston, Topeka, Kans.
Wm. H. Ellis, Bloomington, Wis.
Chester C. Farrell, Conzad, Nebr.
G. Wallace Grant, Bucyrus, Ohio.
Arthur C. Hamm, Denver, Colo.
C. W. Harned, Iowa City, Ia.
F. W. Hergert, Seattle, Wash.
E. G. Howard, Los Angeles, Cal.
M. R. Howard, Denver, Colo.
J. E. Ingalls, Washington, D. C.
C. S. Irwin, Vancouver, Wash.
V. M. Laughlin, Victor, Colo.
John A. Lentz, Phoenix, Ariz.
F. W. McCluer, Lexington, Ky.
A. C. Nelson, Lincoln, Nebr.
Ralph N. Pullen, Denver, Colo.
T. E. Purcell, Kansas City, Mo.
A. B. Souci, Richmond, Ind.
E. F. Warren, Central City, Ohio.
Geo. C. Sharp, Pasadena, Cal.
C. S. Starkweather, Bellaire, Ohio.
C. S. Wilson, Lamar, Colo.

There being no further business, the Council adjourned.

H. C. Brown, *Rec. Sec'y.*

President's Address.

By BURTON LEE THORPE, M.D., D.D.S.

I WOULD be remiss indeed on this occasion, did I not give expression to my grateful appreciation of the high preferment so unanimously and generously conferred upon me by my *confrères* at the last session of this body.

To you who participated in conferring this, the highest honor at the gift of this great profession, the origin of which is distinctly American, I extend my sincere thanks;—as I also do to the secretary, the section officers, and the local committees, for the excellent work they have done in making possible this meeting.

Meeting as we do in this great section of the West, whose citizenship has contributed so much to supplying the bone and sinew of the nation—meeting, too, in this delightful city so near the Alps of America, amid God and nature's handiwork, "where the snow mountains lift their amethyst and sapphire crowns of splendor far and nigh," surrounded by a panorama of which it is truly said, "No artist's brush, no pen can ever describe the majesty of this mountain scenery that must ever remain uppermost and ineffaceable in memory";—under these delightful and inspiring auspices, there is to me but one thing to mar the pleasure of this reunion, and that is the absence of our friend and co-laborer, the late Dr. James Young Crawford, whose recent death casts a shadow of sadness over this occasion. Possessing marked executive and organizing ability, he was a valued member of numerous dental societies, a member of the committees on organization of the Second and Fourth International Dental Congresses, and twice elected president of the American Dental Association, a faithful attendant of it, and largely responsible for the fusion of that association and the Southern Dental Association into this our present National body. His genial presence and sage advice will be missed in our councils. As wine warms one's blood and love warms the human heart, so did the spirit of devotion to his profession predominate his career, overshadowing all else except his devotion to his family.

A GOLDEN ANNIVERSARY.

This occasion is an auspicious one, for at this time we celebrate the golden anniversary of the organization of the American Dental Association, the immediate predecessor of this association, the preliminary meeting for the organization of which was held at Niagara Falls, August 5, 1859, and the first regular meeting at Washington, D. C., July 31, 1860. The

time seems propitious to briefly review the accomplishments of the past half-century.

Organized when jealousy and aloofness were paramount, schools few, and our literature meager, our profession has so developed in scope and character that none who have the interest of our calling at heart have reason to be ashamed of our professional achievements and progress. From our National association has evolved the present systematized collegiate course, largely owing to the National Association of Dental Faculties, also the present dental laws, mainly due to the efforts of the National Association of Dental Examiners, both being the offspring of this parent organization.

As a profession dental surgery has received the recognition which it so justly deserves from the American Medical Association, which in 1881 recognized our specialty as a distinct branch of the healing art and our people as being entitled to membership in that association. Fifty years has seen two distinct specialties evolve from dental surgery, viz, "oral surgery" and "orthodontia." The United States government has given us also signal recognition in the organization of the army dental corps.

Many foreign countries have recognized our high standards in education by sending their students to America for dental training. They have also paid tribute to our scientists and writers in adopting American methods of operative procedure and in translating our textbooks into many foreign languages.

THE F. D. I. MILLER MEMORIAL.

Of recent date the Fédération Dentaire Internationale has paid honor to the memory of W. D. Miller, the late lamented and world-famed dental scientist, whose contributions to his chosen calling were given so generously to his fellows, and who did so much to give our profession caste in foreign lands, in establishing the Miller memorial, the first prize from which was appropriately awarded to G. V. Black.

MEMORIAL TO HORACE WELLS.

Another expression of regard for the contribution to science of an American dentist took place on the United States Square, Paris, France, March 27, 1910, when our appreciative foreign *confrères* unveiled and presented to the city of Paris a statue monument of Horace Wells, the discoverer of surgical anesthesia by the administration of nitrous oxid.

AMERICAN MILLER MEMORIAL.

The Ohio State Dental Society has inaugurated a movement to erect a bronze statue of W. D. Miller in their capital city. This memorial is a laudable one and should have the liberal financial support of every American dentist, for all are beneficiaries of Miller's scientific research.

OUR STANDING.

From various sources we hear of efforts made to belittle our standing as a profession, and of attempts to merge it into stomatology, as a branch of the medical profession.

Prior to 1839, Hayden and Harris failing to get the recognition of the medical faculty, who snobbishly and strenuously opposed the organization of a dental training school as an adjunct to the medical department of the University of

Maryland, with the excuse "that *the subject of dentistry was of little consequence* and thus justified their unfavorable action," as a last resort organized the dental profession as an independent specialty of the healing art. As such it has proudly continued for the past seventy years, and so, I predict, shall it stand indefinitely, when its critics shall be forgotten in the twilight of tradition, and have been swallowed up in the thick night of oblivion.

As a profession, dentistry has made immense strides both in self-culture and in benefits to humanity, all attributable to the purpose intended for it by its founders, viz, to properly educate its practitioners in the science and art of the conservation, treatment, and repair of the human teeth and their dependent structures, *i.e.* jaws, pericemental membranes, and gum tissue. In this, American dental training has led the world. The dental graduate is better prepared on leaving college than any other specialist of medicine, because all his training has been calculated to achieve one aim. A comparison of results between our college product and that of countries where the M.D. degree only is required for practice will clinch the argument for special dental training. If the choice of an intelligent public be an admissible criterion, then the American D.D.S. has scored a signal victory in all countries whose practitioners are required to be M.D.'s. By no means is our present system of dental education perfect, for no education ever was or ever will be perfect, but we are headed in the right direction, and constant furtherance along the present lines will result in the best possible achievement. Before medical men undertake to instruct dentists, they have much to learn. They must consider the teeth and jaws from a different viewpoint and modify the inadequate and often incorrect treatment of the same as indicated in medical text-books.

What has the medical profession contributed to the solution of the saliva problem? Nothing. What can the average M.D., in particular the obstetrician, offer in etiology and therapeutic measures in regard to the pathological condition of the mouth accompanying pregnancy? Nothing.

Furthermore, credit is due to our specialty when we realize that it has received no support from its so-called "mother science," and has arisen phœnix-like and has fully developed itself in spite of the ignominies cast upon it by medical men, who in the past did not take the dental school under their protecting wing on account of their appreciation of our specialty, but because the dental department could be turned into a factor of financial support to the medical department. In return for this, the dental student was permitted to occupy the back seats in the lecture-hall and assimilate the crumbs of medical knowledge.

Whenever there was an opportunity for discrimination the medical student received the benefit, because the other fellow was only "a dental student." And now, why is it that we clamor for medical recognition and are so eager to ape their ways? We have no need to be ashamed of our standing, or to cater to the medical profession. Our degree is "inferior" only because "no one knocks the dentist but the dentist." Our detractors all are of the self-centered "holier than thou" type. Our degree is a badge of honor and culture indicative of special training. After all, the degree counts for little; it is the man and his knowledge behind the degree, for each man is mas-

ter of his destiny, and he alone is responsible to his *clientèle* for the rendering of the high-grade service due them, and for his social standing in the community in which he practices his vocation.

Stomatology is a freak specialty, because it endeavors to embrace syphilology, rhinology, surgery of the head, dental surgery, the treatment of tuberculosis, and, in fact, of all lesions which find any expression in the oral cavity and the adjacent pneumatic sinuses. I call it a freak specialty advisedly, because it encroaches on and tries to deal with diseases which in the natural evolution of medical science have become specialties. It has been suggested that the dentist of the future shall bear the same relation to the stomatologist that the optician bears to the ophthalmologist. A more absurd idea is rarely offered to a thoughtful audience.

For the majority of dental operations no order or prescription can be made out. Most operations upon the teeth, moreover, must be judged in the same light and category as the surgical operations performed upon the eye. For they require the same fine technique and judgment as the most intricate surgical operations performed upon any organ of the human anatomy, the only difference being that dental operations but rarely involve the question of life and death. The dental surgeon does not deal with fatalities. And it is but human that operators upon organs whose health is highly important to the life of the individual will stand relatively higher in the estimation of the general public. However, this need not be construed as a degradation even by the hypersensitive or morbidly vain—for, "Act well your part; therein the honor lies!"

OUR NEEDS.

While the majority of our colleges are doing excellent work, I know I am touching an acutely sensitive nerve when I call attention to the lamentably low standard of some of our present-day collegiate institutions, which with their meager teaching facilities continue to foist their graduates on the unsuspecting public. We need alike more manual training and more thorough instruction in the fundamental scientific studies.

The dental college faculties associations now require graduation from a four years' accredited high-school course. If to this be added four years of study in a dental college, the first two of which years are devoted to fundamental teachings in mechanics and science, and the last two years to special dental training, the graduate in dentistry will be the peer of the graduate of any other profession. Most medical colleges now demand as a minimum for entrance two years of study in a college of liberal arts. Graduates of dental colleges requiring a preliminary education of a four years' accredited high school course ought to have their three years' dental course recognized as the equivalent of the two years of liberal arts training for entrance to medical schools.

DENTAL EDUCATIONAL COUNCIL OF AMERICA.

In April your president was asked to appoint five members to represent the National Dental Association to co-operate with five members each of the National Association of Dental Examiners and the National Association of Dental Faculties in creating the "Dental Educational Council of America," the object of which is the advancement of dental

education and the unifying of the standards of the various national bodies of the dental profession; to inspect the various colleges under their jurisdiction with a view of ascertaining the character of work done, and whether the needs of the community in which colleges exist are fully satisfied; to perfect a model curriculum and make a study of the existing dental laws of the various states, and present a report on the possibilities of more uniform laws. Your president selected Drs. J. V. Conzett, Richard Summa, Louis Meisburger, Howard E. Roberts, and A. R. Melendy to represent the N. D. A. on this council, with the hope that they may assist in bringing about the ideals proposed, which will result in giving our schools a higher standard and placing our profession where it rightly belongs.

REORGANIZATION.

At this session it was proposed to reorganize this society on broader lines, making its scope and character more representative, thus extending the field of dentistry and rendering more honorable service to the public health. The matter of the proposed revision of the constitution and by-laws has been under consideration for two years.

On account of the meager and unsatisfactory responses and evident disinclination on the part of the various state societies to accept the proposed plan of revision, it seems to me that it would be the part of wisdom to defer action for another year, and in the meantime invite all state societies to send representatives to a conference meeting to be called before the next annual session, and thereby endeavor to formulate changes and modifications which will receive the approval of the various state organizations and the profession generally.

Threats have been made by some that, if this society is not reorganized according to the plan of the American Medical Association, a rival association will be the ultimate result. Such disloyalty to this society seems absurd and should be condemned. I viewed with extreme interest the inner workings of the American Medical Association at their recent annual meeting, and found that like most organizations, it was pregnant with so-called "politics" and dominated by a few. In the history of all organizations this has always been and probably always will be. The speaker contends that the organizer and parliamentarian who devotes hours of work to the details and management of a society and eventually assists in promoting those who have executive ability, is as essential to the success of a society and to professional advancement as is the scientist, essayist, and clinician. After all, the most beneficent political institution human ingenuity can devise is the right man in the right place. Whatever the outcome of reorganization may be, the majority should rule, and the minority should graciously accept the decision and put its shoulder to the wheel and unite in a harmony of action and with fraternal good-will in making our National Association one compact body. There is room and work for all elements. Let each do his duty faithfully to his profession, and let us American dentists unite and have only one great National Dental Association. If we do this, then the words of Theodore Roosevelt in closing his recent Romanes Lecture at Oxford will be applicable to us as individuals: "To each of us is vouchsafed the honorable privilege of doing his part, however

small, in that work. Let us strive hardily for success, even if by so doing we risk failure, spurning the poorer souls of small endeavor who know neither failure nor success. Let at least the satisfaction be ours that we have carried onward the lighted torch in our own day and generation. If we do this, then as our eyes close, and we go out into the darkness, and other hands grasp the torch, at least we can say that our part has been borne well and valiantly."

Professional Opportunity.

By C. C. ALLEN, D.D.S.

AT the time when a man is called upon to select his vocation he is so immature in judgment, unripe in experience, and defective in knowledge that he can give this vital subject no adequate consideration and no attention commensurate with its importance. If he give thought to the subject, it must necessarily come from the fallow mind of youth, and it is likely that some prejudiced or ill-founded fancy will determine his choice. Some idea undigested of an easy road to personal gain, an easy way to distinction, or the imaginary promise of emancipation from labor may direct his course. Sometimes the most trivial circumstance apparently in no way connected with a man's future may turn his steps to that vocation which will prove his life-work. Finally and most lamentably, another method by which an individual may assume the responsibility of a profession is that he may have been ordained or selected for it by parental authority or by the authority of custom. While parental authority is actuated by the most profound interest, it cannot be denied that it is generally a prejudiced interest and one self-blinded to the real qualifications of the candidate. This interest, because of its own unselfishness, fails properly to consult and analyze for adaptability.

It happens almost invariably that, no matter what calling a man has espoused, he comes, in time, especially in our restless civilization, to think that if he had chosen some other vocation he would have lived a fuller and more useful life. But notwithstanding these periods of restlessness, the individual once established in his profession usually does good and acceptable work. And from all time to the present there seems to have been no better way of replenishing workers in the various services of man than the methods we have just considered.

Even though cast for our calling by the wisdom of Divinity, we would yet have times of dissatisfaction. Nor is this necessarily reprehensible. For only through healthy unrest do we avoid stagnation and are we inspired to progress. But the dissatisfaction which is to be regretted and condemned is that which comes from selfishness, envy, and failure to appreciate our opportunities.

The beginning of a profession comes with the real beginning of life, and not when a man is full of the wisdom of experience. This always has been since man was first ordered to earn his living in the sweat of his face. It doubtless is a part of the inscrutable scheme that we should not be permitted to bring to bear too much of our personal influence in

laying out the lines of our life-work. Apparent haphazard choice of vocation may be a part of the divine plan to which we have not given due consideration, a guidance which we have not recognized or even suspected. It may be a part of a higher instinct, but an instinct of the same kind that preserves all life in its youth, the difference being only that this instinct is for the preservation of balance in human employments.

So let us not give time to lamenting because of the fancied superiority of some other calling, or grieve because of some real or apparent lack of relative dignity in our own profession. Rather let us give to it just effort, and earn our right to take advantage of the many opportunities it offers for professional recognition and extraneous cultural development. While it is true that no man can completely compass any profession, it is equally true that no profession can completely fill the mentality of any man. He has an inherent desire, a longing, a thirst for something aside from the daily routine of the business in which he has perfected himself to the point of calling it his own. Let us not forget that the first use of all professions is that they may be the servants of men rather than that men should be their servants. No man lives a completely normal life who permits his vocation to enslave him. The enslaved intellect is not capable of the flights of imagination which are absolutely necessary to the proper development of individuality, and no man can serve his fellow creatures in his proper fulness except through the expression of his individuality. True self-interest, in contradistinction to selfish interest, requires from a man that he neglect no opportunity for intellectual and moral advancement. We of this profession are allowed great privileges, perhaps greater than in most callings, for cultural attainment. We can make our profession our servant more completely than can those of many other occupations.

There is little necessity for a man of good balance permitting our profession to enslave him. Its demands of time cannot be, in the nature of things, so exacting as entirely to preclude leisure for other pursuits, and those pursuits may be selected to his liking. It is not necessary that a man should give all of his service to the world within the confines of any one channel. He may also serve in those engagements which bear to him something of the character of relaxation. If one should carry on an extended scientific investigation, he is much more likely to succeed if he pursue this investigation through an impelling though undefined desire. He should pursue it from a devotion which would defy his own analysis, were he not too oblivious to his environment to give the subject any analysis at all. So, though a man pursue a line of investigation within the proper fields of dentistry, yet for the purposes of true gain and true culture and true advancement, he should hold that particular pursuit as entirely outside the realm of his daily professional routine. In this way it becomes to him a pleasurable diversion, a child of love.

There are in our profession, as well as in others, many who peer through the blue glass of pessimism. They devote a remarkable amount of energy and time to lamentation. They fail to see that we make any progress; that we have accomplished anything, or ever will. They find fault with the *personnel* of our profession, because they fancy it lacks intellectual qualification. Did these men really see the abundant opportunity that

our calling affords for all kinds of good work, they would not waste their time in abusing it and the men in it from an assumed position of superiority. These men should, for the purpose of personal experiment, place themselves outside the profession, should view it extraneously—get away from it a little while; look at it as men do who know nothing of it; get the layman's angle—and it may reveal to them some virtues hitherto unsuspected, some sweetness unappreciated because of their fretful discontent.

There are times when all of us wish for more rapid advancement, and there are times when all of us feel wofully our limitations. But there is never a time for a jeremiad against our calling which shall consist principally in abusing the good men within it, merely because they do not measure to the fancied standard of a malcontent. Such railers, wrapped in the atmosphere of their own gloomy conceit, have absolutely failed to recognize the knockings of Opportunity.

A man's vocation is his instrument for gaining a livelihood, and he is under obligation to master that vocation, that the service which he gives may be worthy of compensation. This end being accomplished, a man's fealty to his vocation merges into the greater duty of general citizenship. A man is part of the state, and should never lose sight of that fact. The state reflects his individuality, be it good or bad. These things being true, it follows that a man's greatest privilege is the advancement of his fellows. And this can be done best by his own sublimation. Nor is it necessary for the most complete accomplishment of this high end that a man should feel within him any of the stirrings of selfish ambition, any desire for personal emolument, aggrandizement, fame, or power.

The higher service of mankind demands a range of thought which far outmeasures the confines of any profession, though thoughtful consideration takes note of the immense amount of detail which is necessary to gain proficiency in one. Few professions ramify to the extent of ours. Few professions exact tribute of so many others. Few professions require for their excellent service men of as varied accomplishments, general knowledge, and versatility. Therefore, having mastered ours, we have laid the best and most enduring of all foundations for progress.

You men have laid this foundation. You have accomplished much for dentistry. You have attained prominence, you have earned competences, you have achieved professional success. Your profession has treated you well. It has fulfilled the dreams which brought you to its threshold. How will you repay your obligation? Will you enrich it with the fulness of your enriched manhood? You have served your apprenticeship—you are masters of your craft. It has opened the doors of opportunity. Will you pass them by? You men of maturity have traveled the long road which has brought you to professional eminence. You stand where "No shadow falls to east or west, in manhood's glorious noon." You have earned an hour for meditation. Let us use it to consider our obligation to the past and our duty to the future. The fruits of all the past await your garnering. You can in some measure return to Eden. It is now that life will unfold at your command. It is the time for you to begin to live, and in this broader and fuller life you can reflect upon your parent profession that glory which will dignify it and raise it in the eyes of men. Let us view those fields and pursue those

paths that tend to the broadening of cultural refinement. We can now, to an extent, escape the deadening grind. We can devote more time to the contemplation of the subtle beauties of nature. We may now receive our lessons free from the annoying intricacies of detail. Advancement may now be ours untrammeled by laborious effort. We are no longer prisoners of circumstance or slaves of necessity.

In broadening our views to the utmost we do not need in any sense to neglect or disregard our profession, but rather let us carry it with us. Great generals know more than war; great lawyers know more than law; great physicians know more than medicine; and we of our profession should know more than dentistry. Our work in dentistry is not a work which tends to arouse the mind to the dreaming of great dreams, as in the case in some of our sister professions. It has little of the glamor of romance. It is therefore necessary, in order to keep the mind in that perpetual youth which makes for all accomplishment, that the imagination be given other range and food for cultivation. This, fortunately, we are better equipped to do than many of our fellow laborers.

We must give freedom to imagination, the most majestic of all mental attributes, and wrest from the infinite store such ideas as present themselves to our minds, made receptive by cultivation. It is not necessary to specify any particular fields that we should cultivate in our seeking after higher intellectual attainments. All are open to us, and each may choose and serve according to the measure of his soul.

Let us not build with the futile idea that our fame shall live in enduring bronze or memorials of stone, but do our work for the blessing of man, so that it shall remain a beneficent influence long after all fashioned monuments shall have disintegrated atom by atom. It is not the seeker after tangible reward who recognizes his real opportunity. The alchemist sought to transmute base metals into gold, but out of the alembics of our souls let us bring the enzyme of happiness and peace. In fidelity and gratitude shall we treasure our profession, but the majesty of destiny demands of us also a larger service: "Follow thou thy vocation, but heed the King when he calleth thee."

Discussion.

Dr. Chas. S. Butler, Buffalo, N. Y. It is not an easy task to discuss a paper that is pitched in so high a key as Dr. Allen's. The response, however, is made easier by the fact that the pitch is in the major and not in the minor key. In any discussion of a paper of this character, all that we can hope to do is to carry a little farther some of the suggestions or ideas that have been presented by the author.

There are two thoughts in the paper to which I want to call your attention: First, that our profession begins with the life of him who is to follow it. If this be true, how important becomes the training of the child along such lines as shall the most perfectly fit him to become a professional man. This shows at once the burden of responsibility upon the parent, and we are glad to recognize that in these days the parent is coming to feel that a greater responsibility for the future of his child than has heretofore been assumed lies upon him. This means, you will see, not only the intellectual training of the child along proper lines, and a technical training that shall

fit him for the profession in which he may afterward engage, but also the development of a high moral conception of duty and of his relation to his fellow men as he advances toward the goal for which he is striving.

I am not one of those who feel or believe that we are inferior to any of the other learned professions in appreciation of the value of high moral and ethical training. I think we are at least on a parity with them in that regard. And yet I am sure it would be the testimony of every one here that we have not yet attained the highest possible development of the young men and the young women who enter our profession along the line of moral and ethical ideas of which they are capable.

The other thought in the paper which to me seems fundamental to us is the necessity of having some one or more things outside of our vocation in which we should be interested. It is impossible for any man or woman to be well developed physically if the physical training is to follow along one line only. It is equally true that development only along the line of our professional work produces, not symmetrical characters, but characters narrowed and dwarfed and confined within the limits of that one line of development. So it becomes necessary, if we are to be developed intellectually, morally, and professionally into all-round men and women, we should have something other than our professional work to which we may turn in our hours of leisure and recreation. There are just three things, it seems to me, outside of recreation in the way of physical exercise, that are of supreme importance: First, a love of literature and a pursuit of the best thoughts of the best writers of our own and other ages; second, a love of art in all its forms; and third, a love for music, which is the very highest expression of art.

There is nothing in all the world, to my mind, that keeps men and women sweet and lovable like a devotion to these three things. The man or woman who can always have a song in the heart, who can always have a thought of the beautiful whether expressed or unexpressed, and whose mind is constantly dwelling upon the very best thoughts that are preserved to us in literature, is the most useful and therefore the happiest man or woman to be found in our complex society of today. When I speak of a love of music, I mean a love for that song of life which should always be pitched in the major key. Of course we must remember that there is and perhaps must always be among the unfortunate in life a song that is not in the major but in the minor key, and it is the great privilege of men and women situated as we are to sing to them of those happier, brighter, and more beautiful things in life.

It has been said, "The human in use barely pays expenses, but the divine pays dividends." And that is the thought of the essayist when he sets before us those things which are so important, and above all are so valuable, not only to us as individuals, but to all with whom we are associated in life's great pilgrimage.

The Esthetic and Anatomical Basis of Dental Prosthesis.

By J. LEON WILLIAMS, D.D.S., L.D.S.

I AM down on the program of this meeting to speak on the subject of the esthetic and anatomical basis of dental prosthesis, but I should like you to regard this paper merely as a report of progress so far as the anatomical aspect of the subject is concerned. I believe that there is much valuable work yet to be done in establishing anatomical correlation between the teeth and other features of the face. You will see the direction in which this work is progressing, and something of the reason on which my hope for further results is based. In addition to this I may say that I have cast this paper in the form of a special plea for better things from the esthetic or artistic point of view.

The esthetic standard of dental prosthesis is primarily determined by the artistic quality of the porcelain teeth used, and a correct anatomical basis demands that these teeth should be so shaped that correct anatomical relationship can be secured with them. Up to the present time we have never had porcelain teeth fulfilling either of these requirements, and dental prosthesis, therefore, has never had a creditable esthetic or anatomical basis. I have used strong language on this point on several occasions during the three years that I have been giving special attention to the subject, but I have said nothing that I wish to retract or modify. I have said that the present status of dental prosthesis is a disgrace to the profession, and that statement, in my judgment, is not one whit too strong. I am doing what I can to remedy the present condition of things, and I have taken this long journey to give you my views as to the proper standard of dental prosthesis; to tell you what I have so far accomplished, and what is of far greater interest to me, to find out the real attitude of this representative organization of my native country toward the subject. I desire especially to get in touch with the men of the great West, you who dwell in the land of deep skies and far horizons. I believe you have more imagination and a quicker perception than we who live in the big cities of the East. I want to know your views, your ideals, and I want your co-operation in the effort to realize the highest ideals we can form—because I do not think it is possible for any one man to give the highest possible expression to those ideals. The work of securing such

improvements in porcelain teeth as are possible is difficult, very difficult, as some of you no doubt partly realize. I say *partly* realize, because I do not think anyone could fully realize these difficulties unless he had had the experience I have passed through during the last year or two.

Well, I have, I believe, cleared away most of the initial difficulties, and if those who are most interested in the subject are now willing to give a little time and effort to the work, we can have what we want.

Disraeli, a very keen observer and student of men and things, once said, "You can have anything you like if only you want it enough," but a keener observer and a deeper thinker than Disraeli expressed the thought somewhat differently. He represented the Master of the Universe as saying, "Here is everything; take what you like—and pay the price for it." That is the whole statement. If you are willing to pay the price you can have anything you like, if only you want it enough.

WHAT TO WANT.

What to want, then, becomes the most important problem in life. Our wants all center about the hope of realizing an ideal of some sort, and the great mistake that nations, organizations, and individuals are constantly making is in accepting something less than their ideal. That constitutes the fall of man; it is for that compromise that he is always being driven out of Eden. A little sluggishness of the gray matter of his brain, perhaps; a little torpidity of imagination, and he accepts the little prize waiting there at his elbow and forfeits the splendid reward he might have had tomorrow. "A bird in the hand is worth two in the bush," says the practical man, and he sells himself for the dollar offered today, just a little too dull to see that he might have had the bird in his hand and the two in the bush and all the forest and all the birds—if only he could take the longer view. That represents the difference between the so-called practical man, who is really the most impractical creature on earth, and the idealist. The practical man not only wishes to have his feet solidly planted on the earth, but he desires also to grip it with his hands. In other words, he simply wants what is within reach, and with that he is content. He it is who is satisfied with things as they are; of him the author of a notable book recently published says, "He is governed by the prudent conservatism of the animals, whose highest ambition is to live securely amongst things as they are."

But the idealist is always a little disturbed by the working of that divine discontent which arises in the imagination and the chief characteristic of which is the power to realize deferred values. He represents the very spirit of evolution —the force that is always in the effort to bring something higher out of that which is lower. He is never satisfied with things as they are; he has not "the prudent conservatism of the animals." He is the reformer, the minority, the unpopular, but he pushes the world along, and the worst of his lot is that he is shackled to that hulking big brother of his, the practical man, and has to drag him along also.

This little homily is introduced near the beginning of my lecture, for the purpose of forcing you all to consider yourselves idealists. I want you all on my side, "on the side of the angels," as dear old Dr. Atkinson used to say, and after

these opening remarks I imagine there is not one of you will dare to even think of himself as a so-called practical man who has the "prudent conservatism of the animals and is satisfied with things as they are." I shall assume, therefore, that I am speaking to an audience of idealists, and that our ideal in this matter is the highest possible standard for dental prosthesis.

CAN DENTAL PROSTHESIS BECOME GENUINE ART WORK?

Now, the first question I wish to ask is a vital one, which goes straight to the heart of the whole matter. The answer to that question determines, from my point of view, the whole status of this branch of our professional work. And that question is: Can dental prosthesis be raised to a position where it can properly be regarded as art work? If it cannot, then I see but little hope of lifting it out of the slough of mere mechanical drudgery where it now lies. But if, as I think, it is capable of taking rank as genuine art work, if the public can be educated to recognize it as such, and if, as I think, it offers a far wider scope for the exercise of artistic knowledge, judgment, and skill than any other branch of our profession and than many other things which are accepted as art work, then there is a hopeful, encouraging outlook for this long-neglected branch of our profession.

Now, if we are going to consider this question quite seriously (and I beg to assure you that I have not come here to do anything else), we must first determine what art work really is, because obviously we cannot discuss the esthetic or artistic basis of dental prosthesis unless there is an artistic basis to discuss. What is art? There are many definitions of art in print, and I can only allude to some of the more important of them.

DEFINITIONS OF ART.

Tolstoi has devoted an entire volume to a discussion of the question, "What is art?" It is a scathing analysis of the mutually destructive opinions of most of the famous art critics. Tolstoi does not himself give a satisfactory definition of art, but he says some very wise things about it. According to him, infectiousness is one of the primary conditions of all good art. The artist must infect all who look at his work with something of the feeling which prompted him to do it. That is undoubtedly true, and it will help us forward a long step if we can discover any common feeling that is acting in all artists in their work.

I think another modern writer has made an important contribution toward that discovery. He has produced a book in which he discusses the theme, "Delight the Soul of Art." That, also, comes close to the heart of the matter. The artist must surely have delight in his work, and that in itself should constitute the larger part of the impulse and feeling which moves him and which he wishes to communicate to others. Delight or joy, as a moving force, lies very close to the heart of the creative impulse.

Of the same penetrative and illuminating character is that wonderfully beautiful definition of art given by Plotinus eighteen centuries ago. "Art," he says, "deals with things forever incapable of definition, and that belong to love, beauty, joy, and worship; the shapes, powers, and glory of which are forever building, unbuilding, and rebuilding in each man's soul and in the soul of the

whole world." That definition, too, you see, implies creative forces at work, and also the identity of the human and the universal forces.

I am not going to apologize for pitching this part of my theme in a high key. It is not by accident that I am giving first consideration to the esthetic basis of dental prosthesis. Not only in our professional work, but in every phase of modern life, the point of view of art is grossly neglected, to our great detriment. For art deals with the larger and better things of life; it stimulates far the more important side of life. We have become so intoxicated with science, so hypnotized with the very word, so infatuated with processes of weighing, measuring, and recording, that we have come to regard these things as ends in themselves, whereas, the things of science have absolutely no significance whatever except in so far as art makes use of them. Science is analytic, preparatory. Science has to do with the examination of raw material, and the more we know about our materials, the more accomplished we may become in the use of them.

Now, if there is anyone who thinks for a moment that there is anything in my attitude of mind that leans toward a disparagement of science, I will ask him to read a paper of mine published some years ago in the *Cosmos* on the "Scientific *versus* the Empirical Method." What I am trying to do just now is to emphasize the relative value of the effect of art on life. Sir Francis Galton, one of the most eminent scientific men now living, said recently, while speaking on his favorite subject of eugenics, "If these principles are ever to become effective, they will have to be got into the national heart and conscience like a religion." There was a great scientific authority recognizing the important fact that, if you want to get force, driving power, for a reform movement, you must enter the emotional regions of the mind where art reigns. Science, by its methods of examination, analysis, and comparison, lays the foundation for all progress. On this foundation art rears the superstructure; art dreams things into existence. And I want to say to every young man in our profession, Don't try to seize what are usually called the "realities" of life with the grasp of one in a dream. That is what most men try to do. Reverse the order. Dream your dreams and then take hold of them with the virile grip of reality—the grip of a soul that is wide awake. Art lives in the region of dreams; and there is nothing in the world today worth serious consideration, there never will be anything in the world worth serious consideration, that is not the result of a dream—the effect of intellect, fired by imagination, playing with the raw material of the world, the so-called facts of science. Art is synthetic, creative. As Plotinus suggested, it is in the exercise of these synthetic faculties that man approaches most closely to that power which has created himself and the universe. And because man touches his highest level when he is creating, therefore it is that art work, creative work, brings the greatest satisfaction. The first, the most important thing in human life, is to find that use for our faculties and powers in which we can have the greatest delight. The man who has discovered his work and the means of expressing himself in it with joy has found the philosopher's stone and the elixir of life.

You may regard one serious part of my effort today as an attempt to bring such new motives to bear on our work

as will enable us to find great delight in doing it and real joy in its accomplishment, and I will give you this as a good working definition of art: *Art is the creative instinct in man, born of imagination and expressing itself with joy.* Any product of human knowledge and skill which contains evidence of *imagination and delight* on the part of its creator is a work of art.

TRUE ART IMPLIES AN INTIMATE STUDY OF NATURE BY THE ARTIST.

And I should hasten to add to that the statement that the characteristics of all good art throughout all time have been founded on or have been due to a most patient, prolonged, intimate study of nature on the part of the artist, and his power to select from this study whatever is truly significant and vital to his theme, and to reject all else. The degradation of any art has always come about by the introduction of certain conventions or fashions of treatment, which men copy from each other. The artist no longer goes direct to nature for his inspiration, or attempts to express directly the emotion which nature produces in him, but he tries to express something prescribed for him by conventional forms and rules. He no longer makes an effort to express *himself* with joy, but tries to express at second-hand the joy of some one he calls a master. If the matter is painting, he copies the master's brushwork and his method of using color. If it is sculpture, he imitates the handling of drapery or finish of surfaces, the exaggeration of certain features and the slighting or subduing of others. Art work of this sort becomes more and more exact, mechanical, and lifeless, or in other words, conventional.

FIG. 1.

Head of Villa Medici Meleager.
(*Greek version.*)

FIG. 2.

Head of Vatican Meleager.
(*Græco-Roman copy.*)

[From "Antike Denkmaeler," I, Pl. XL.]

I can perhaps best demonstrate my point by the use of an illustration from a recent work on Greek sculpture by E. A. Gardner, of the University of London.* The view on the screen shows the famous Medici Meleager (Fig. 1) and a Græco-Roman copy in the Vatican (Fig. 2). Professor Gardner says of the copy that it shows "just the perfection of form, the absence of individuality, the vacancy of expression and character, the vapid generalization of type which modern critics are too often wont to regard as the usual qualities of the 'antique'"—while the original, the Medici head, shows "less perfection, more individuality, and, above all, the expression is full of character realized and reproduced with a marvelous directness of observation. One is the fresh and vigorous embodiment of the master's conception; the other is the cold and academic generalization of a conventional school."

That illustration and that quotation cannot be regarded as far-fetched, as some might think at first glance, because the illustration and the quotation express in the most fit and perfect terms the situation in regard to dental prosthesis as I wish to bring it before you. The same influences and the same standard produced that Græco-Roman copy of the Greek masterpiece that have produced the artificial teeth of today. An artificial standard is set up, a conventionalizing of nature, and we may say of the present manufacturing product as Professor Gardner says of the highly finished copy of the Greek head, that they exhibit mechanical perfection of form, total absence of individuality, vacancy of expression and character, and vapid generalization of type. I think that is a perfectly true and just criticism, and at the same time as crushing a condemnation as can be framed in words. The Greek head is fine art, because it is the result of a profoundly intimate knowledge of nature. The Roman head is bad art, because it represents nature conventionalized by arbitrary rules. And, as the degradation of art always comes about by conventionalizing it, by departing from nature, so, conversely, the only way to effect a reform in art matters is to go back to nature. Throughout the entire history of art that has always been the cry of the reformer: Back to nature!

An eminent artist and art critic of the present day has said, "Be reverent before nature and honest with yourself, and your art will ring true every time. He who attempts to improve on nature either lacks good judgment or is endowed with a conceit so colossal that there is no health in him." Rodin, the greatest modern sculptor, says, "All the great ones who have charmed us by their talent have done nothing throughout the ages but reproduce nature. They copy as close as ever they can the most beautiful, the most admirable, the most perfect thing in the world—which is nature." There you have the emphatic statement of two great artists as to what the basis of art is—a faithful rendering of nature. I say rendering of nature, because these statements do not imply that any given work of art should be an exact copy throughout of any particular model. The very essence of art is selection, and the power of the artist lies largely in his perception of that in nature which is essential, as distinguished from the

* "Six Greek Sculptors." By Ernest Arthur Gardner, M.A., Yates professor of archeology, University of London; formerly director of the British School, Athens. London: Duckworth & Co. New York: Chas. Scribner's Sons. 1910.

merely accidental. To the portrait painter, for illustration, the lines about the corners of the mouth, or the curve of an eyelid would be essential in expressing the character of the face, but a wart on the nose or a scar on the cheek would be accidental.

Well, now, I think we may sum up our answer to the question, "What is a work of art?" by saying that it is a human rendering of any beautiful object in nature. Profound knowledge of the object rendered, together with imagination and delight in the craft, must be evident in the finished work. I am, of course, perfectly aware that there is a special definition of art which is more particularly applied to excellence of craftsmanship, and I know that this definition specially applies to our work, but in this paper I wish to call attention to and to emphasize the importance of that attitude of mind toward our work which recognizes the higher aspect and interpretation of art. All art, in its broadest significance, is an interpretation of life.

My next object will be to show you how far the artificial teeth of today fall below the standard we have set up, and then to examine the possibility of our being able to reach that standard, that ideal, as applied to dental prosthesis.

Long familiarity with the mechanical perfection and hard, exact, geometrical outlines of artificial teeth has undoubtedly blunted our sensibility and perception of the far finer beauty of the natural teeth.

Ruskin says, "You cannot like good art so long as you look at bad art." And Tolstoi expresses the same idea when he remarks that "Accustoming people to something resembling art, dis-accustoms them to the comprehension of real art."

If the exquisite beauty of the natural teeth had really been closely observed and studied by the profession as a whole, artificial teeth as made today could not be tolerated for a moment. Probably the most effective and convincing way of bringing these facts home to you is to show you natural and artificial teeth side by side.

The photograph now on the screen (Fig. 3) shows a complete set of lower natural teeth, and the best substitutes that I could find for them in artificial teeth. Many of you, perhaps, have never before realized the striking difference between natural and artificial teeth. Observe the great subtlety and delicacy of outline in the natural teeth, and the stiff, wooden, purely conventional character of the artificial teeth. In natural teeth the lower centrals and laterals are characterized by a convex curve on their mesial approximal surfaces and a concave curve in their distal surfaces. (See Fig. 4.) I have never seen that special distinguishing feature well shown in artificial teeth. The differences in width and shape between the lower centrals and laterals is never correctly represented in artificial teeth, and the bicuspids and molars are ridiculous caricatures of the natural organs. In the natural teeth you will rarely find pairs of teeth exactly alike; even the central incisors usually have slight variations. The total absence of these slight variations in artificial teeth is one of the principal reasons why they look so false in the mouth. Going over some of these points with a manufacturer one day, he remarked, rather petulantly, that these things were, after all, "mere trifles." I could not refrain from quoting the famous saying of Michelangelo on that criticism: "Yes, each one of these things is a trifle, perhaps; but

the sum of trifles is perfection, and *perfection is no trifle.*" Another manufacturer said, while looking at some of the student's sketch. "Oh," said one of the pupils, "just look at that—he has added only such a little bit, and see now

Fig. 3.

the plaster models which I had carved for the new system of teeth, "I do not see anything very original about this work—just a little difference here and there from what we are doing." And that reminded me of an anecdote about the Russian artist, Bruloff. He was examining the work of his pupils one day, when he took a brush and palette from one of them and added a few touches to

what a difference!" "Yes, my boy," replied Bruloff, "remember that art begins where the *little bit* begins." Browning

Fig. 4.

has put the same thought in an even more striking way:

> The little more, and how much it is!
> The little less, and what worlds away!

Fig. 5.

I will show you one more set of natural teeth in contrast with artificial, and this example is particularly interesting

from the fact that I sent the incisors of the natural set to three of the largest

Fig. 6.

Lower centrals—natural and artificial.

firms engaged in manufacturing and selling artificial teeth, with a request for a

Fig. 8.

Lower bicuspids—natural and artificial.

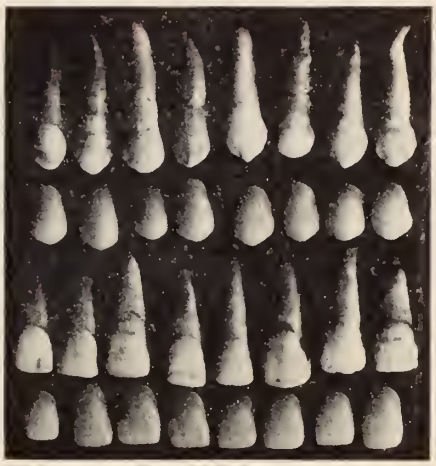
set matching the natural teeth as closely as possible. The photograph on the screen shows the best that they could do. (Fig. 5.) While the best match that I could get for the lower set of natural teeth came from an American manufacturer, this upper set is from an English firm. English artificial teeth are nearly always inferior to American in color, but nearly always superior in form; especially is this true of the upper incisors. In this set there is an approximation to

Fig. 7.

Lower laterals—natural and artificial.

the natural teeth in the centrals and laterals, but it is no more than that, and

Fig. 9.



Centrals and canines—natural and artificial.

the canines, bicuspids, and molars are hopelessly out of comparison. It would give me a grim satisfaction to spend the whole evening in continuing these comparisons, but I must content myself with two or three more illustrations, and then

pass on to other phases of my theme. The radical differences between natural and artificial teeth are strikingly brought out in these pairs which I now show you (Figs. 6, 7, 8, and 9). So far as I am aware, there is nothing made in artificial teeth remotely resembling those beautiful natural teeth. The artificial teeth are totally devoid of artistic merit. One of the most common shapes of incisors is not made by any manufacturer today, so far as my knowledge goes. (See Fig. 10—the lowest row.)

The mere exhibition of these forms is an unanswerable argument against the present condition of things. Of the faults of our present artificial teeth from the standpoint of utility, I shall speak later. I am now only concerned with their esthetic aspect. If the practitioner in dental prosthesis is to produce a work of art, his raw material must give opportunity for the display of his artistic knowledge, taste, and imagination. He must be able to take delight in his work. Now, that is hardly possible with such material as he can command today. In truth, the more competent the man is, the more impossible it becomes for him to find delight in his work. For years I have not taken up an artificial set of teeth in the preparation of a denture without a feeling of exasperation at the patience or indifference or ignorance of the dental profession in using such mechanically perfect travesties of human teeth.

Fig. 10.

Fig. 11.

Upper set of natural teeth and set of plaster models from same, carved one-fifth larger to allow for shrinkage in porcelain in the baking.

The first step toward remedying this deplorable condition of things is to get porcelain teeth of the highest possible standard of artistic merit. The natural

teeth are among the most beautiful objects in nature. There is nothing more subtle in nature, from the artist's point of view, than the curves of a human tooth. I believe there is no more difficult thing in nature to model than a human tooth. If we are to be artists in our work, we must understand and appreciate this. If we are to produce works of art, we must closely study this subtle beauty of the natural teeth, and reproduce it in dental prosthesis. A set of artificial teeth should be such a perfect imitation of nature that even the most perfectly trained eye should be unable to discover whether they were natural or artificial. (Fig. 11.) And there is nothing in all this beyond the reach of the man with even mediocre natural ability. The average man who wishes to reach that standard can do so. Geo. Bourne says, "Outside the ranks of idiocy, there are few full-grown persons who have not neglected in themselves more gifts than they have ever cultivated." Nothing truer has ever been said. I repeat, then, that the esthetic basis of dental prosthesis must be porcelain teeth of the highest artistic merit; and in the production of these we must be governed by precisely the same broad general principles that govern the production of all art work.

"SELECTION" IN DESIGNING MODELS FOR PORCELAIN TEETH.

I have already called your attention to selection as one of the first principles of art. Let us see how it applies to the designing of models for porcelain teeth. If it were thought essential that every possible patient should have artificial teeth which should be an exact copy in every particular of his natural teeth, then the number of molds to be provided would have to be equal to the number of possible patients in the whole world. What is the rational alternative to that absurdity? Certainly not the indefinite production of molds without any pretense of a governing principle of order or system. That leads only to the land of confusion and exhausted patience.

A long and critical study of the natural teeth has shown that there are but few typical or characteristic forms, and of these few forms there is an indefinite number of very *slight* modifications. The fact that there is not as great a variation in teeth as in faces, or in the other features of faces, is in accordance with the law that the lower the form of organization of a tissue the less liable it is to change and variation; or, perhaps I should say, the slower is change effected. The difference between the highest and lowest type of brain in any civilized race is very great. The teeth from the skull containing such brains might be indistinguishable. If we take a collection of a hundred natural teeth, central incisors let us say, as these are the most characteristic, and carefully study them, we soon discover that they can all be arranged in a few groups, and that the principal difference between those in any group is simply a difference in size. Most of the other minute differences are entirely negligible from the standpoint of art and utility. (See Fig. 10.)

In fact, no one, I care not how long he has studied the subject, could give any esthetic reason why any one of the incisors from a group would be better than another for any one of the mouths from which that particular group was composed. To put the matter in another way, let us suppose a hundred persons all having teeth of the same general type

and size. If it were possible to transfer every set of teeth so that no person in the group had the set of teeth which developed in his jaws, then it would not be within the scope of human knowledge and perception to discover that such a change had been effected. Now, that is an exceedingly important fact determined in our investigation, because it points the way to the most practical and scientific method to be followed in designing a system of artificial teeth.

It is impossible to exactly reproduce in porcelain every set of natural teeth. It would not be desirable to do so if it were possible, for the reason I have just given. For several years I have been studying the forms of natural teeth very closely—in the mouths of my patients, in the various collections in museums, and in the streets, for even there one may learn much from careful observation. Some time ago I designed a special set of impression trays for taking impressions of the upper and lower incisors at the same time. You have on the screen (Fig. 12) a selection of models made from these impressions. There are eleven models shown there, representing four types of teeth, and those four types will represent three-fourths of all the human teeth I have ever seen. I have made drawings of all the distinct types of teeth I have found, and these drawings at the present time number twelve. Some of them are rather closely related, but each one seems to me to have some feature of sufficient importance to be considered typal. Some of these types vary slightly in length, but all other variations, except that of size, are entirely

Fig. 12.

negligible. Now I assert—and I shall be glad to have any one question my assertion, if he can give any reason for doing it—that if these twelve types of teeth were produced in three sizes, making thirty-six molds in all, they would supply the needs of the dental profession far better than all the other molds of artificial teeth now in existence.

In the first place, each of these forms has a definite character, and that cannot be said of most of the teeth as now made. Two of the largest manufacturers selected a few sets of teeth for me, which they say cover nine-tenths of their sales, and the striking thing about the teeth selected is that they all bear a strong resemblance to each other, and none of them have any marked characteristics. That nine-tenths of the artificial teeth used should be much alike and of that characterless appearance, fully justifies one of my opening statements—that the present condition of prosthetic dentistry is a disgrace to the profession. Some blame the manufacturers for this condition of things, but what right have we to blame them when the first step toward concerted action in this matter has never been taken by the profession? How are the manufacturers to know what we want when we have never made the slightest effort to express our wants in any effective manner? One of our largest manufacturers said some time ago in an advertisement, "Learn to know what you want, and then see that you get it." That is fine! That is worthy of being shouted into the ears of the profession through a giant megaphone.

I have referred to the variation in size of the different types of teeth. That will be an important feature of the new system of teeth. At the present time, if any given form of tooth is made in more than one size, I think it is purely accidental. Size is almost as important as type in the production of the best esthetic effect in artificial teeth in relation to the other features of the face. In ignoring minor and unessential details, and fixing upon marked character and type in designing the new system of teeth, I have followed the fundamental principle of all good art. Much as the great authorities in art matters differ in some questions, they are, I believe, all united on that point of the essential nature of selection. In the production of any given type of tooth, I secure or consult as many specimens as I can of that particular type, and I embody in the new form all that is characteristic and common to all the specimens. Everything else is unessential to such an extent that if the new tooth were to be used as a substitute for any of the specimens consulted in making the studies for this type, the most expert eye would be unable to detect anything inharmonious in its relations. Art can go no farther than that in this special field. In my method of working in carving models I follow closely the methods of the best artists in other branches of art. An artist, in modeling or drawing the face, aims to get the broad planes as quickly as he can with the fewest possible strokes. And so in carving a tooth I try to get the character of the tooth with the first few strokes of the knife.

Notwithstanding all the sound esthetic reasons I have presented for having artificial teeth made in the closest possible imitation of nature, I am, of course, perfectly aware that there is a considerable body of dentists who say that the majority of patients will not have artificial teeth which present all the essential features of the natural teeth.

That is an objection that I find it difficult to deal with patiently and courteously. It exasperates me when I hear men talk in such a way that the whole effect of their talk is to cheapen themselves. But I realize that a large amount of educational work has to be done both in the profession and on the part of the public before a radical change can be effected in the degraded taste which largely prevails today. I think one question which can, with a slight variation, be put to dentist and patient alike will go far toward putting this whole problem in a clear light.

To the dentist let us say, "Is it in accordance with your ideals of what dental prosthesis should be that you should be able to fashion an artificial denture so perfectly in harmony with the general lines of the face and so perfectly true to the character of the natural teeth suited for that face that the most critical of your brother practitioners would be unable to determine that the work was artificial?" To the patient let us say, "Do you desire artificial teeth so false to your age and complexion, so out of harmony with the size and contour of your face, that the most uncritical would see at a glance a shocking display of vulgar taste?"

The answer to these questions determines the whole matter, and there is, or should be, no compromise between the extremes.

THE QUESTION OF COLOR.

I have touched on the esthetic significance of form and size in porcelain teeth, and there remains to consider only the question of color.

On this point I hope to have something of importance to communicate a little later. At the present moment I can only say that I am engaged in the work of trying to adapt the Lovibond method of color standardization to porcelain teeth. This, so far as my knowledge goes, is the most successful scientific attempt to standardize color in its application to arts, manufactures, and various forms of research that has been made. The essential feature of this system is a series of colored glass slips, the forming of which was accomplished by a corps of trained observers working for two years. It has already been adopted in biological and physiological research work for standardizing the color of skin, eyes, hair, etc., and I can see no reason why the correlation between the color of skin, eyes, hair, and teeth should not be determined and established, so that the dentist may easily make his color selection of teeth with scientific accuracy. I am quite confident that I shall be able to make this possible. You are familiar with the efforts that have been made to base the selection of artificial teeth on what are called temperamental characteristics. For a long time I have felt, with many others, that this term, temperament, is much too vague, ill defined, to be of any real value in scientific work. And I find that most writers who make use of the term introduce it as connoting mental or psychical rather than physical characteristics. Here, for instance, is the author of a work dealing largely with matters psychical, saying of a certain type of individual: "Whether he is choosing a wife or tying up a shoe-lace or clinching a bargain, the action is still marked by some touch of the *temperament that lives in him.*" That seems to me to be the legitimate way of using the term. While I think we shall have no great difficulty in establishing corre-

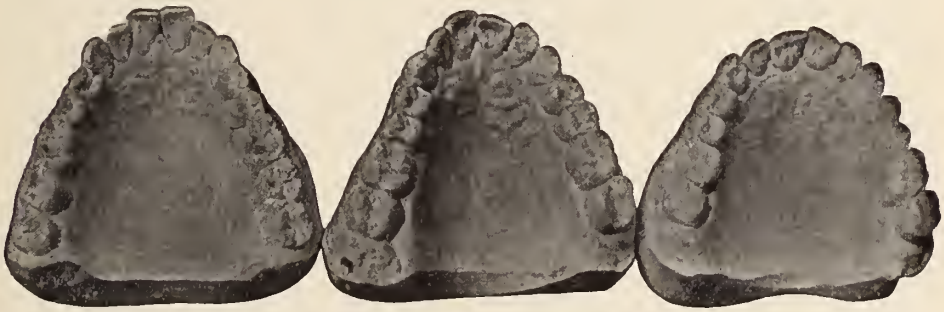
lations of color between teeth and the hair, the eyes, and the skin. I am very doubtful about relationship of form. I will illustrate what I mean by the aid of a few slides. You have on the screen the photographs of three men. (Figs. 13, 14, and 15.) According to the rules of those who have drawn up our tables of temperaments, the gentleman on the left should be classed as nervo-bilious, and the other two, who closely resemble each other in color of skin, eyes, and hair, and also in mental and racial peculiarities, would be called nervo-sanguine. But when we come to examine the shape of the heads and faces of these three men, we find the correlations between one of the nervo-sanguine subjects and the nervo-bilious gentleman much closer than between the two we have put down as nervo-sanguine. And then, when we come to examine the jaws and teeth, we find these correlations even more striking. One of the nervo-sanguine

Fig. 13.

Fig. 14.

Fig. 15.

Fig. 16.



The cast on the left is from a "nervo-bilious" subject. The two casts on the right are from "nervo-sanguine" subjects.

and the nervo-bilious have faces long in proportion to width. The zygomatic arches have a marked forward slope. The other nervo-sanguine has a fairly broad face with wide, squarish zygomatic arches. Now, when we look at the models of the maxillary arches of these three heads, we see at a glance where the correlations are. (Fig. 16.) Temperamental characteristics seem to count for nothing, while the general shape of face and head, especially the shape of the zygomatic arches, determines the shape of the maxilla and also appears to govern the length and shape of the teeth. I introduce this illustration merely to enforce what I believe to be an important fact, namely, that we are now on the way to a more scientific classification of typal forms of teeth than is afforded by the so-called temperamental classification. I shall call your further attention to one of these correlations again in a few moments.

THE ANATOMICAL BASIS.

I have occupied some considerable time in making what I feel has been an inadequate presentation of the esthetic side of our subject, but I am quite sure it will be supplemented and greatly strengthened by the contributions of those who are to discuss the paper. I must now pass to a brief consideration of the other phases of my theme. The anatomical basis of dental prosthesis is of course in many ways intimately related to the esthetic basis. If a set of artificial teeth is anatomically correct and they are placed in the correct anatomical position, they will be harmonious in all their relations. The esthetic effect will be pleasing and satisfactory. (I have observed that it has become the fashion in recent years to use the term "cosmetic" where I use the word "esthetic." I do not know who introduced this term, but I am afraid that my sense of justice and fair play will not allow me to fall in with this custom. I think it is unfair to the barber and the perfumer to filch from them a term which they have made peculiarly their own.)

Fig. 17.

In my efforts to discover what the anatomical basis should be for any given case of dental prosthesis, I invented some years ago a form of craniometer. I think the most original feature of this instrument is the hinged bar for showing facial shape or inclination. It also differs from some of the best craniometers in being applicable to the skull and also to the living head. (Fig. 17.) Four important measurements are read simultaneously with this instrument—the distance from the external meatus to the depression in the maxilla above the central incisors, the width of the skull between the ears, the inclination of the face, which

is recorded in degrees on the segment of a circle, and, by means of a tape fastened to the bar which enters the ear opening, the distance over the top of the skull

Fig. 18.

from one ear to the other. Several things of importance to dental prosthesis have resulted from the use of this instrument. First, it is found that in all normal dentures, with rare exceptions, the general

Fig. 20.

facial angle gives the inclination of the upper incisors. I will show you several photographs made from skulls of a great range of races, and also from living heads, and you will observe that a line drawn from the most prominent point on the forehead to the tip of the chin is exactly parallel to the long axis of the central incisors. This you will see

Fig. 19.

is a fact of first-rate importance in establishing the inclination of the teeth, for this inclination of the incisors is a faulty feature in most artificial dentures. (Figs. 18–22; see also 13, 14, and 15.)

Fig. 21.

A suitable instrument for this use can be made very quickly, for any given case, from a piece of stiff cardboard. All articulators should have a hinged lever or indicator on the front, regulated by a

set-screw, so that when the position of the central incisors is once determined, this indicator may be fixed in position. The incisors can then be removed for grinding or for any other purpose. The position of the incisors thus determines the position of every other tooth in the mouth.

I have also discovered—at least it is a discovery as far as I am aware—that

Fig. 22.

the shape of the maxillary arch has for its special correlation not the length and width of the skull as a whole—although it is, of course, to some extent correlated with the skull—but the zygomatic arches. Brachycephalic skulls do not necessarily have wide, round maxillary arches, nor do dolichocephalic skulls always have long, narrow arches, but exceptions are very rare, so far as my observations extend, to the rule that the width and the length of the maxillary arch follow closely the width and length of the zygomatic arches. And, furthermore, the direction of the curve formed by the buccal surfaces of the teeth follows almost exactly, in the great majority of cases, the curve of the zygomatic arches.

I shall show you photographs of skulls from a great range of races as wide apart as the Patagonians and Fuegians are from the modern European, and also a few very ancient skulls, illustrating this point. (Figs. 23–26.) If you think for a moment, is not this correlation exactly what you would expect when you consider the attachments and actions of the great muscles of mastication, more especially the working of the temporal and masseter muscles?

There is no doubt whatever in my mind but what the vigorous action of these muscles in childhood tends to produce wide zygomatic and maxillary arches. This may be of more interest to the orthodontist than to the prosthodontist, but the presence of wide zygomatic arches indicates the form of the curve of the incisors; and this is an important factor in the arrangement of artificial teeth. The fault most frequently observed in this connection is the arrangement of the incisors in artificial dentures in too wide a curve, in cases where the zygomatic arches slope forward rather markedly toward the nose. This gives a particularly artificial and unpleasant expression to the mouth.*

The shape and length of the teeth correspond in a general way with the shape and length of the face, but the law I have already mentioned makes it difficult to formulate any fixed rule for the selection of teeth for any given face. Here, in illustration, is a photograph showing three skulls of markedly different shapes with but little variation in the shape and size of the teeth. (Figs. 27–29.) I cannot remember ever to have seen markedly long teeth in a round face, but

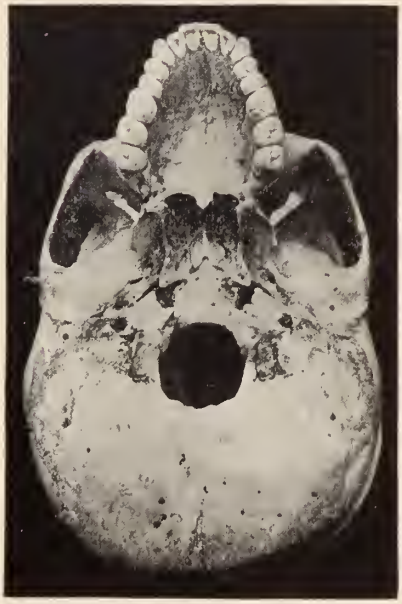
* An article on "The Normal Arch of the Maxilla," based on these observations, is in course of preparation.

FIG. 23.

FIG. 24.

FIG. 25.

FIG. 26.



one not infrequently sees rather square or slightly oval-shaped teeth in long faces. I am constantly studying and taking measurements in the hope of discovering some correlation that will serve as a guide in this matter.

Fig. 27.

Fig. 28.

Fig. 29.

I hope some of the gentlemen who are to follow me will have observations of value to make on this point. I have noticed one peculiarity in the arrangement of the natural teeth that is very constant. Where the upper part of the face is wide and the lower part narrow, sloping to a delicate, pointed chin, there is more or less overlapping of the points of the upper central incisors. This type of face usually indicates a sensitive, delicate nature, and the teeth are generally of a beautiful egg-shaped oval. I am engaged, in addition to my other work in this field, in the preparation of what we may call an atlas of faces, showing typal forms of teeth. These faces will be arranged in classes according to the types of teeth, and models of the teeth, presented in two aspects, will be shown beside each face. Such an atlas should be of great assistance in the selection of artificial teeth.

In the very notable series of articles which Professor Gysi of Zurich has contributed to the *Cosmos,* he has shown the anatomical and mechanical bases of dental prosthesis to be so intimately associated as to be impossible of separation. His paper is such a thoroughly scientific and exhaustive presentation of this phase

of my theme that it hardly seems necessary for me to dwell at any considerable length on details. Aside from his demonstration of the value of his articulator, the practical point of special value which Dr. Gysi has brought out and proved with great clearness and scientific exactitude is the relationship between condyle path and rotation points and the angles of the masticating surfaces of the teeth. For the first time he has put the whole subject on a thoroughly scientific basis, and I cannot see how it is possible for self-respecting dentists to longer ignore anatomical articulation in dental prosthesis. But Dr. Gysi in his own practice can only imperfectly apply the results of his own investigations, and such results as he is able to obtain are only secured by much tedious grinding of porcelain! In the series of articles to which I have referred, he says: "As no artificial molars with the proper compensating cuspal surfaces are manufactured, we are compelled to shape the molars properly by grinding them." The new system of teeth will save all that, for the method I have discovered of articulating the plaster models from which the teeth will be made accomplishes perfectly the work which is now only to be approximated by long wearisome grinding. I say that the results which you will be able to obtain with the new teeth with little or no grinding can now only be approximated by much grinding, because there are few artificial molars made today that contain sufficient material to give opportunity for grinding. The iron of this grinding business must have entered into many a man's soul, if I may judge from some of the letters I have received since I have been engaged in this work. I will read you just one short letter, which is typical of many:

Dear Doctor,—Don't say that my grinding days will soon be over and my fingers will no longer be sore—the news seems too good to be true! I have gone down the line from the old hinge articulator to the Snow articulator and face bow, and I have ground all the way. I have been down on my knees time and time again in prayer for a better tooth, one more like the Master constructed, and at last I believe you are going to give it to us. Keep after them—don't let up for a minute! As we say over here, give them the rush act and don't let them think until they have the teeth on the market. I want to say you have or will have done a great work when these goods are produced. Your effort should appeal to every man who wants to reach a higher standard.

With best wishes for your undertaking,

* * *

That the sort of experience graphically portrayed in that brief letter should have gone on year after year throughout our profession without any concerted effort to do away with the necessity for it is surely an astounding thing.

A few earnest workers in the profession have been trying to get a natural, anatomical articulation of artificial teeth which are made from models that have never been set up and articulated in any scientific manner. And that is another astounding fact. We, as a profession, like to think that we have artistic proclivities and accomplishments in our work. We also like to think that we are cultivating a scientific attitude of mind toward all professional questions. But I am going to say to you that in this field of prosthetic dentistry we, as a profession, stand without sufficient rags of accomplishment to cover our scientific and artistic nakedness. In the making of that which constitutes the foundation

of dental prosthesis—porcelain teeth—hardly a single scientific principle has been brought to bear on the work with reference to their efficiency in the mouth. And as to that other equally important aspect—well, they may, perhaps, be considered *cosmetic,* may properly be ranked with puffs, powders and perfumery, but esthetic, artistic, they certainly are not.

Let us rise up now and join hands and do away with this condition of things. Let us have the raw material for scientific and artistic work. Let us have something that will be a credit to the profession, and then we can demand from the public that recognition for our work that is due to all valuable scientific and artistic productions.

WHAT HAS ALREADY BEEN DONE.

I will tell you what I have accomplished in this direction up to date, and I hope you will find in what I have done a sufficient foundation for that concerted action which is necessary to complete the work in the most satisfactory manner possible.

And first as to the work considered as a system. I have already pointed out the futility and the disadvantages of a great number of molds or patterns of teeth. I have shown you that the whole range of our needs can be far better supplied with twelve types of teeth in three sizes to each type. This entire range of molds can be obtained in two trays about fifteen by twenty inches in size. These trays of dummy or specimen pinless teeth, in the form of the vulcanite pattern, let us say, can be supplied at small cost, and thus every practitioner could have at his hand the entire range of the whole system. These specimen trays would also contain the complete range of color. But there are also further advantages in the new system. I have worked out a method of standardization, by means of which the faces of all the different kinds of teeth, whether crowns, plate teeth, vulcanite teeth, or special facings for bridge work, are exactly alike. Now, see how this works out in practice. From your specimen tray of vulcanite teeth you select the exact type, size, and color that you desire. But you want the teeth for a full upper set of bridge work. You selected, let us say, mold 7, size 2, color 10. You can send in your order with those specifications, to which you merely add the words, "bridge-work facings," with the certainty of getting precisely what your pattern showed you, but in form for bridge work; and so with any other type of tooth you may wish. But that is not all; let us follow up your case of bridge work. Under the present system, after you have selected your facings, you have to produce your gold masticating surfaces. Now, there is no means provided today whereby you can make masticating surfaces perfectly adapted to those facings. There is nothing scientific or artistic about the methods by means of which that step is accomplished now. It is done after a fashion, by much grinding, and consequent loss of time. And further, suppose, as is not infrequently the case, you wish to articulate that piece of bridge work with an artificial denture in the opposite jaw. The gold masticating surfaces will have no proper articulation with your porcelain teeth. Now see what happens with the new system. You have selected an upper set of vulcanite models for your order for bridge-work facings. You take the lower set, which matches that and which is perfectly articulated with it, for your lower denture. Then

you take your set of models, from which your selection of facings was made, and from the masticating surfaces of those models you make your dies for stamping the gold grinding surfaces for your bridge-work facings. They will fit the facings perfectly, and they will articulate perfectly with the lower set, because they have all been made from the same models. In this way you have available for making the masticating surfaces of crowns and bridges the entire range of the molars and bicuspids of your whole system of teeth. That makes the present system of die plates look rather antiquated, does it not? I have shown to the gentlemen who are to discuss this paper an upper set of bridge work articulated with a lower set of vulcanite work, after the manner I have described, and the masticating surfaces of the gold and the porcelain teeth have not been touched to a grinding wheel. That shows you what standardization means as applied to artificial teeth. You are the complete master of your instrument now, while before, your instrument was the complete master of you.

I have said that the method I have devised of articulating the plaster models from which the new teeth are made produces, automatically, all the conditions on the masticating surfaces of molars and bicuspids called for in Professor Gysi's scientific treatise. This had all been worked out before those articles appeared in the *Cosmos,* but during a visit to Professor Gysi since, I got a number of valuable hints from him. The form given to the masticating surfaces of molars and bicuspids by my method of articulating the plaster models applies only to what may be called the broad planes of these surfaces.

The first requisite in mastication with artificial teeth is that the grinding surfaces of the upper and lower teeth shall glide freely and smoothly over each other in lateral movements of the mandible. That having been effected in the models, the next step is to carve the detail of the grinding surfaces. And that I consider one of the most important features of the new teeth from the standpoint of utility. The statement that a flat masticating surface is the worst that can be given to artificial teeth would seem to be self-evident, and yet that is the form most frequently found in dentures today. The morsal surface of upper and lower molars and bicuspids in artificial dentures should consist of a series of points and ridges, carved without changing those broad planes which insure smooth movement. There is no fear of getting those points and ridges too sharp, for the process of baking the porcelain teeth destroys all edge to the ridges. As to the form of these points and ridges, I think nature supplies, in unworn teeth, every hint that we need.

And so, instead of the rounded domes which you find on the masticating surfaces of molars and bicuspids as now made, and which have little or no crushing or tearing power on food, the new teeth will have their tearing, grinding, and comminuting power perfected to the greatest possible degree. I am perfectly well aware that notwithstanding all that is being said about the desirability of setting up artificial teeth so as to secure the advantages of the lateral movements of the mandible, many, perhaps the majority of dentists, will continue for some time to use the ordinary hinged articulator. But even for these the new teeth will possess the great advantage of hav-

ing a masticating power probably double that of teeth as now made, in addition to their great esthetic superiority.

There is one other new feature in the new system of teeth which I consider important. They are carved and articulated so that the upper incisors set a little forward of the lower incisors. I have long noticed that there is a tendency in edentulous mouths for the lower jaw to drop forward slightly in all movements, and I find that if the upper incisors are set forward a little, the upper denture is less likely to be tripped and dislodged.

Financial success in dental prosthesis is no necessary part of my theme, but I should be a poor student of human nature if I did not know that such success must always be one of the inducements for reaching a higher level of accomplishment in the work. But more than that, I consider it a part of the duty of everyone to demand an adequate return for his services according to the value and quality of that service.

Some of you may be thinking that I have used rather harsh expressions in referring to the present condition of prosthetic dentistry. But I want you to believe that my criticisms are not the strictures of a pessimist. There is no more confirmed optimist in our profession than I am. There is no one who has a larger hope or belief than I have in what our profession is destined to accomplish. But it is not possible to enter the path that leads forward and upward until we realize just where we are and where to look for the upward path. If men are indifferent to the splendid possibilities of our calling, I want to see them shocked or shamed out of their indifference—got out of it somehow, I care not how. I want to see all men in our profession more successful; and the great secret of success is never to be satisfied with success. I am not, as I have said, indifferent to the material reward, which should be one result of taking higher ground in this field. In truth, I think the demand for that material reward one effective way of educating the public.

Any man of average ability can acquire the necessary knowledge and skill to practice prosthetic dentistry as a fine art, but if he wishes to educate his followers, his patients, to appreciate it as an art, he must also learn how to present the claims of his work as an art. There is no difficulty whatever in getting the wealthy and well-to-do people of this country to appreciate dental prosthesis as a fine art, and pay for it as such. But the dentist must be able to "deliver the goods," he must perfect himself in his art and learn how to talk about it as an art. It will be helpful, I think, if we consider for a moment how a landscape artist, let us say, goes about perfecting himself in his art and building up his reputation. He studies nature patiently, enthusiastically, perseveringly for years; in fact, he is always studying nature. He makes innumerable studies and sketches, and these become of the greatest value to him in the production of his more important works of art. And then, he has to educate a following. Not long ago I saw a letter written by the great French art critic, Theodore Duret, to a friend, asking him if he could find someone who would take fifteen or twenty of Monet's paintings at 100 fr. each, as the artist was in desperate straits. That letter was written about twenty-five years ago, and those same pictures which went begging for purchasers at twenty-five dollars each sell under the hammer, today, for four to five thousand dollars each. What has made the change? The education of a

following—nothing else. Now, something of that same kind of thing can be done by any ambitious man in dentistry. He must begin by doing precisely what the artist does—study nature closely. He must saturate his mind with a knowledge of the natural teeth and all their relationships with their surroundings. He must make a great collection of sketches; that is to say, he must never miss an opportunity of securing, after the manner I described and showed on the screen, an impression of a beautiful set of natural teeth. He must secure photographs of faces showing these teeth, and all the while that he is accumulating a precious store of knowledge he is educating his people, his patients, and others, to a finer appreciation of art in dentistry. He must show these sketches and photographs and explain their value to him in his work, and then, with artificial teeth modeled after nature, he is prepared to produce art work and demand an adequate fee for it. The man who will do that can laugh quackery and financial competition to scorn. That is the way, and the only way, to kill quackery and cheap business methods in dentistry. It is far easier to get a fee of two hundred dollars than twenty when you have got the right material to work with and know how to use it. And the man who will start on this course will soon become so fascinated with his work, he will find it a source of such delight, that he will infect his patients with his enthusiasm, and they will become his best friends and supporters in his work. And the reactive power on his own nature of that attitude toward his work is beyond all computation; that it is which enables a man to lift his work out of the region of the drudgery of the hands into the realm of the creative work of the mind. When he has once done that, his work becomes an ever-increasing stimulus to all that is best in him. The man in whom the inspiration or the passion for perfection is dead or dormant has lost the key and secret of the world. A man's destiny is more deeply affected by his occupation and his attitude toward his occupation than by everything else. Let us dignify our work, and our work will dignify us!

Discussion.

Dr. A. W. Starbuck, Denver, Colo. The main object of this paper seems to be a plea for a better and more natural appearing artificial tooth. We are all conversant with the conditions regarding the manufacture of artificial teeth and the difficulty in getting the manufacturers to produce anything along artistic lines. This is mainly due to the attitude of the dental profession itself, and if the profession as a whole demanded something more nearly approaching the ideal, I am convinced that it would obtain what it desired. This state of things prevails not only in the domain of plate work, but in the work which the dentist himself performs in his laboratory in the way of crown and bridge work, even though facings which the manufacturers produce are not used.

It is hoped that many members of the profession may be persuaded to take up this work as the essayist desires, and if this can be done, the manufacturers will certainly fall into line. But if they believe that the demand of the profession generally is for something that is easy to handle, without any great regard for esthetic effects, we will never be able to secure any improvement in this direction.

A great many men do not consider it possible to use teeth with the character of occlusal surface shown by the work of Dr. Williams, with prominent cusps and big sulci and so forth, thinking perhaps that with a crown made in that way, the roots could not stand the stress, and artificial dentures would not stay in place. But this failure to stand up under the stress of mastication is most likely due to the fact that the cusps are too long and do not occlude properly, and of course it is necessary to use the anatomical articulator to avoid such trouble.

The dental schools are possibly at fault in not having this work pushed forward sooner, on account of the fact that in their prosthetic work they still use the old-style articulators, setting up the teeth as they come, and in bridge work using the crown articulators, instead of using the anatomical articulator, as they should. I think we as a profession should endeavor to carry out the desire of the essayist, and follow nature, not only in our plate work, but more particularly in our crown and bridge work.

Dr. E. S. Gaylord, New Haven, Conn. I shall not tax you with a long discussion of this paper, but I take pleasure in addressing you on account of my relations with the essayist in his great work. We should congratulate ourselves upon the fact that this work is being performed by an American, and that he is willing to devote his time and his money to come such a distance to present this subject to us.

I wish to present just one practical view, which may be an incentive to bringing about what the essayist desires. All who have listened to this paper must acknowledge the great value of the perfected forms of teeth which he proposes to have brought into use. In fact, as he tells us, we have at the present time no teeth which represent with approximate fidelity the forms of nature. If we recognize the vital importance of that fact, the reform must come. We must recognize also that the dental laboratories are not disposed to take up new matters and invest their money in them unless they have some incentive or prospect of return.

We must inquire of what value this great improvement would be to each of us. If we recognize it as being of value, I am sure we cannot do otherwise than demand of the manufacturer a certain number of sets of these teeth. If you are willing to put your hand in your pocket to pay for these perfected goods, it would greatly expedite what Dr. Williams so much desires, and this end would be much more quickly attained than by merely talking over the matter or writing letters indorsing the plan proposed, and letting the manufacturers use their own judgment as to whether there is a demand for such improved goods after they are produced.

I simply make this hint, as it may be of possible value in forcing the makers of artificial teeth to put on the market a product for which there is really a demand, the pattern for which Dr. Williams has placed in their hands.

In addition to what I have said, I have the authority to make a statement which will tend to show the appreciation of at least one dealer of the great value of these teeth in the forms suggested by Dr. Williams. This man has been in touch with the profession for about ten years as a traveling salesman, and he stated to me that if he can obtain the forms that Dr. Williams has produced, he will at once give his order for one million of these teeth.

We could supplement this by each of us ordering from ten to fifty sets of these improved forms, thus stimulating the manufacturers to go ahead and supply a present demand. That would mean putting our hands in our pockets and in a practical way giving an encouragement to the manufacturers which would certainly be very effective.

Dr. Geo. H. Wilson, Cleveland, Ohio. It has been a great treat to us to look at these specimens which we have had portrayed today. It is a blessing that we have such a man as Dr. Williams in our profession, and that he is willing to devote his time and money to perfecting this essential feature of our profession. It will never be possible for the operative dentist to preserve the natural teeth for all time, although we so much desire to keep them intact. We hope that the present methods of operative dentistry will be so improved that the life of the natural denture will be much prolonged. However, there will always be a demand for artificial dentures, and if we are to maintain our claim of being artists and esthetists, we must endeavor to make our art conceal art, but under present conditions that has been quite a difficult task.

It is true that we have been obliged to accept what was placed before us, but we have not been willing to give the time and labor to prepare the material provided in as artistic a manner as possible. On account of the money-getting craze of the age, we have not been willing to do the best work we could, therefore it is well to have material placed upon the market that will save much of this labor. The essayist has certainly presented a plan that will minimize labor, and give us a far superior product.

One feature which the essayist has brought before us seems to me a particularly valuable one. There are a number of forms of the natural teeth that can be reproduced and classified so that we can designate them and call for what we want. This will facilitate better work.

Another feature to which the essayist called attention is the relationship between the dental and zygomatic arches. That is simply a modification, reduced to a practical method, of the temperamental basis by which we have been working. The study of temperament is a very difficult one as laid down in the text-books. It is so complicated that it forms no certain guide to work upon, but when we can reduce it to a few simple rules, as suggested in this paper, it will be an easy matter for us to follow nature and secure a type of teeth that will harmonize. Harmony is the thought expressed in one word; it is the foundation of esthetics as applied to our work.

The question then arises as to the practicability of applying this art as we have had it presented. We have had beautifully portrayed in these illustrations what can be done in art. But how can we apply it? Can we have harmony throughout the work? We have had the shape and form beautifully presented, but can we have the texture of the tooth provided so that it will also conceal art? We may have the color and the form, and yet the texture of the tooth may be so far removed from the appearance of the natural enamel and dentin that the eye cannot be deceived.

We have a great variety of artificial teeth upon the market at the present time, yet many of them are so translucent that they have almost the appearance of glass, and not that of porcelain; yet the manufacturers produce them because they say they are demanded by the profes-

sion. I think the profession demands that we shall have a natural, life-like porcelain. We trust that Dr. Williams, in putting this work before us, will not consent to permit the manufacturers to dominate in the character of the material that they shall put in these teeth, but that it shall be demanded that the texture of these improved forms of teeth shall be as natural as it is possible to make. Not as natural as it is expedient to make on account of cost, but as natural as it is possible to make. With these teeth on the market, there will be no excuse for not securing the esthetic effect in our artificial dentures at all times, even though the production of these teeth may entail a greater cost. But if we shall have them perfected in one direction, and not in another, it means that the manufacturer is going to fail in getting rid of the product, because the profession will not accept them. We live in an age which demands the best that can be produced and I trust that in the production of these teeth nothing but the best in every direction will be placed upon the market.

Dr. N. S. Hoff, Ann Arbor, Mich. There is much that I would like to say in the discussion of this paper, as it treats a theme which in my view requires very careful consideration and very earnest discussion, but our time is so limited that it will not be possible to do more than take a mere glance at the subject presented to us.

I would characterize this paper as one of the most important contributions to our literature. It has illuminated the field of our practical work. I am sure it will come to be recognized as one of the great classics on a subject that we are not accustomed to consider from such a standpoint.

I feel under the deepest obligations personally, and I know you all do, to Dr. Williams. That a man of such able and eminent qualifications has undertaken a work of this kind and has investigated the subject with so much thoroughness and from so scientific and artistic a standpoint puts it on the highest possible basis, and challenges us to assist him in his most worthy ambition to lift this work to a professional standard.

The essayist has brought out so many of the artistic phases that this feature of the address is to me of even more value than the practical aspect, or the providing of suitable materials for our work. There has never been so full and comprehensive a presentation of this subject from the artistic side in all our literature, to my knowledge.

This work is so tremendously important and so comprehensive that I want to offer a resolution which I have written on the spur of the moment, and which, though it is inadequate, may in some slight degree at least represent to Dr. Williams our attitude toward him and his great work, and I trust it will inspire the manufacturers of artificial teeth with a greater degree of confidence. I offer this resolution and move its adoption:

Resolved, That the National Dental Association, in convention assembled, cordially indorses the work done by Dr. J. Leon Williams in undertaking to improve the anatomical forms of artificial teeth. We believe that his labors have produced better types and forms of teeth than we now have, and we respectfully request that our manufacturers take steps to provide these teeth for us at as early a date as possible.

The motion offered by Dr. Hoff was regularly seconded, and carried unanimously.

The President. We had intended to have a general discussion of this paper,

but as the hour is so late and we must adjourn, I will call upon Dr. Williams to close the discussion.

Dr. WILLIAMS (closing the discussion). There is but very little for me to say which will add anything to the significance of what has been said. I should like to pass one comment on something which Dr. Starbuck said with regard to the difficulties in the way of using the anatomic teeth. It is the testimony of all who have made an effort to reproduce the natural teeth so far as they could in porcelain, that when the formation is once given to them, they are far easier to use than the forms of teeth now on the market. I have seen Dr. Gysi articulate the molars and bicuspids, when they have once been ground to suit him, in fifteen minutes. The reason therefor is that it is almost impossible to get the teeth out of place. They are so perfectly articulated when the teeth come into our hands that the teeth themselves become the guide as to where they should go.

I think when a practitioner once familiarizes himself with the new teeth he will be able to articulate them with much greater ease than he does the teeth of today.

Dr. Wilson brought up the subject of texture. That is a point about which I have conferred with the manufacturers. I have made some suggestions as to how to improve the surface, or texture, for it is the quality of the surface which gives the appearance of texture, and I know that the manufacturers have made improvements and are willing to make more experiments in order to bring about an improved quality or texture to the surface of the teeth. Dr. Wilson also referred to the increase in the price of these teeth. I have been asked if the new teeth are going to cost the same as the teeth on the market today. I replied that I most certainly hoped not. In the year in which I started practice I read a quotation from the great manufacturer of English porcelain, Wedgewood, which —without attempting to give the exact words—was about as follows: Competition for cheapness and not for excellence of workmanship is the surest cause of failure and decline of the arts and crafts.*

You can hardly fail to perceive that in the preparation of this paper I have had two main objects in view; first, an effort to make the younger men who are coming into the profession think more highly of themselves and their calling, and, second, to show you that it is now possible to establish a much higher standard in one important branch of our profession.

Tell me, do you not think it strange that the dental profession has never uttered a decisive word nor has ever been consulted as to how porcelain teeth should be made? It is an undeniable fact, and I challenge anyone to contradict it, that the men who do the cheapest and most vulgar work in this department of dentistry—work totally devoid of any

*[The quotation in full is as follows: "All works of taste must bear a price in proportion to the skill, taste, time, expense, and risk attending their invention and manufacture. Those things called dear are, when justly estimated, the cheapest; they are attended with much less profit to the artist than those which everybody calls cheap. Beautiful forms and compositions are not made by chance, nor can they ever, in any material, be made at small expense. A competition for cheapness, and not for excellence of workmanship, is the most frequent and certain cause of the rapid decay and entire destruction of arts and manufactures."]

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semblance of artistic merit—possess the controlling influence in preventing progress in dental prosthesis. The men who buy four thousand sets of teeth of one grade and color in one order, and put them into every mouth which they can devastate—a row of white beans in a vulcanite chip—these are the men who have called the tune to which the reputable members of our profession have to dance.

You have for many years been indignant under that burden of ignominy. The opportunity is now before you to throw that burden off. I want to see the reputable men of our profession control our professional interests. They have had too little to do with that down to the present time. There are many indications of an improvement in this direction, and I, for one, pledge myself to do what I can to help the success of this movement.

There remains to me only the pleasant privilege of thanking the members of this National Association most sincerely for their cordial reception and most patient attention accorded to a rather long paper. I appreciate your patient consideration for a fellow countryman who becomes more attached to his own country the longer he remains away from it.

Dr. Gaylord. In view of the great value of Dr. Williams' work to ourselves and to humanity, I move that we present to him a vote of thanks for coming before us and presenting this subject in such an able manner.

The motion was seconded by Dr. Wilson, and carried unanimously.

Report of Committee on Scientific Research.

By HENRY C. FERRIS, D.D.S.

MR. PRESIDENT AND GENTLEMEN,—One year ago your committee made a report which entailed a great deal of work, and brought out a technique for salivary analysis, with a set of instruments and reagents. We did not expect to arouse a great deal of enthusiasm in this field, but hoped to find three or four men out of the entire membership of this society who would lend us a hand and report a few cases as requested. This did not prove to be our experience. Even though Eimer & Amend reported to us that they sold twenty outfits, we have received not one salivary analysis.

This experience, while a little discouraging, has nevertheless acted as a stimulus, and we again appeal to you, hoping that our presentation of the practical value of the research in this field will induce those who are analytically inclined to take up this work.

The American dentist has become famous the world over for his technical skill in mechanics. His advance in this particular has been phenomenal; his ability to re-establish the lost surfaces of the teeth and establish a normal occlusion has placed him in the front rank. But is it not true that in an effort to excel in this phase of our work we are forgetting that we operate upon a physical structure, a part of the human organism?

What do we know of the physiology of the organ of mastication, containing thirty-two teeth with one hundred and thirty-four inclined planes in normal occlusion? Are you aware of the fact that one of the leading physiologists of Europe commences his work with the gastric digestion, stating that the food is not long enough in the oral cavity to undergo any chemical or physiological changes? This assumption ignores the most powerful voluntary organ of the body, which produces forty-eight ounces of secretion daily, containing two or more animal ferments, and an oxydase with the power of instantly converting all free starches into dextrin, and albumin partially into albuminose, with a distinctive mucus which is detectable by gastric analysis. We believe this organ to be worthy of more consideration by the physiologist.

Furthermore, delicate reflex influences govern the flow and selection of the different kinds of saliva for the different kinds of foods, as has been proved by the experiments of the great biologist,

Professor Pawlow of Russia, in which he has shown, by feeding a dog one hundred and eleven times in a room with a bell ringing, again nineteen times in the presence of the odor of camphor, and one hundred times in a room with a red light, that the intensity of the reflex action of the auditory, olfactory, and optic nerves upon the salivary glands can be established.

He further showed that by feeding a dog with cracker crumbs his parotid glands were stimulated, and that by feeding him with meat the submaxillary and sublingual glands were markedly stimulated, to the exclusion of all others.

By feeding the dog fifty times with one drop of mustard oil he established a continuous reflex which operated for three days.

Moreover, the selection by the nerves of the tongue of the different kinds of food for the different forms of teeth has been shown in the Correspondent's Report of the New York State Dental Society this year. Are not these findings worthy of further consideration and more intimate study?

It has been proved by the experiments of Prof. A. Michel, M.D., director of the Royal Dental College, Wuerzburg-on-Main, Germany, that a man minus his molars showed starch globules in his feces, and minus his biscupids showed meat fibers in his feces, and that the artificial restoration of these teeth resulted in the correction of these abnormalities. These experiments also proved that, contrary to the physiologist's statements, the pancreatic secretion was ineffective in the reduction of starches, and that therefore, without sufficient mastication effected by proper teeth, complete chemical change and perfect digestion could not be accomplished. The findings of this scholar were verified by the examination of 2000 specimens of feces, carried on by Dr. Felix von Oefele, a New York pathologist of international reputation, and by two or three other investigators in Germany.

Professors Black and Kirk have been working for years upon the chemical changes that occur in the presence of caries and other lesions of the oral cavity, emphasizing the fact that a vicious cycle is set up by the improper functioning or use of this voluntary organ, leading to fermentation and putrefaction of starches and proteid substances in the intestines, the products of which are absorbed by the blood and so are conveyed to the oral cavity through the saliva, altering the environment of the teeth; and are also conveyed to the liver and kidneys, producing disease in these organs. These facts should be sufficient to cause us to consider our field from a more scientific standpoint, and possibly to open the way for a specialty in oral pathology.

We therefore again appeal to you for a more careful consideration of this branch of our calling. If a physician were asked if he be able to make a urinary analysis, he would be insulted; but how many among you are able to make a salivary analysis?

One physician in our country, Bernard R. LeRoy, M.D., of Athens, Ohio, in a paper published in the *American Journal of Ophthalmology,* May 1909, states that by salivary analysis and by re-establishment of the normal chemical balance he has produced the absorption of cataracts in four cases, enabling the blind to see without surgical operation. It is evident that the importance of a normal organ of mastication places our specialty

upon a higher plane in the healing art than we have been inclined to claim for it. Should we not devote more of our time and thought to improving our information upon this subject?

The time has come when the dentist, if he will but take advantage of his opportunities, can become the peer of the specialists in the healing art, for it cannot be denied that primary lesions of all kinds are manifest in the salivary secretion before they are shown in any other excretions. It remains simply for us to determine the physiological properties of this secretion, to be able to read our findings. This takes *time,* but numbers of helping hands would obviate this difficulty. It takes *money,* but a voluntary subscription will take care of that. This work is for those among the young men who are fond of chemistry and analytical work. These men are expected to establish the physiological properties of, and the comparative relationship between the enzymic value of saliva and mucin, sulfocyanates and ammonia, chlorin and urea. The last comparison has been made in urinary analysis, and it has been found that a constant relationship exists which may be called a vital measure, the proportion being 1:2, the chlorin decreasing in disease. In order to facilitate the examination for urea, your chairman has modified a Doremus ureometer, which will give accurate findings in one ccm. of specimen fluid, and may be purchased of Eimer & Amend of New York. To make this technique accessible to you, we have printed a pamphlet containing complete technical information for your guidance, with many modifications of the methods presented last year, and we trust that there will be many to avail themselves of this guide:

Technique for Salivary Analysis.

History of chronic diseases.

Description of teeth and character of caries.

Amount of saliva. Normal average, 60 ccm. per hour; 20 ccm. required for examination.

Consistence. Report sticky, thick, or thin.

Odor. Ammoniacal, sweet, sour, etc.

Specific gravity. Normal 1.002.

Precipitate. Centrifuge entire amount and record in terms of the centrifuge scale. Then take 5 ccm. of this and dilute with an equal quantity of aqua destillata, which will become cloudy if globulin is present. Centrifuge again, and record amount of globulin. Pour off supernatant fluid again in the centrifuge tube; add four drops of glacial acetic acid, which precipitates the mucin. Pour off supernatant fluid and add 1 ccm. of 10 per cent. solution potassium ferrocyanid; if albumin be present, specimen will become cloudy. Centrifuge as before and record quantity of albumin.

Enzymic action. Take immediately upon delivery. Make 2 per cent. solution of starch paste, according to the following directions: Mix starch with half the quantity of cold water, and let stand for five minutes; then add the rest of the water, and boil for ten minutes. Take 5 ccm. of this solution in test tube and place in incubator at temperature of 55° C., to which add ½ ccm. saliva, let stand for one minute and boil to kill action of enzyme. Centrifuge, and read scale, which will give percentage of reduction of starch to dextrin. To determine further the product of the reaction, take 2 ccm. of the clear solution and add 1 ccm. of iodin solution N/250. If starch is present the reaction will be deep violet (iodid of starch); if a light violet, it indicates a partial reduction of starch, or erythrodextrin; a colorless result indicates complete reduction of starch to dextrin.

Proteolytic test. To 4 ccm. of specimen add 4 m. saturated solution of sodium hydrate; then add ½ ccm. of the following solution: 5 m. of Fehling's copper solution to 5 ccm. aqua destillata. If albuminose be present,

the reaction will be a light violet on top of specimen.

Oxydase test. Take 1 ccm. saliva. 4 ccm. aqua destillata, 12 drops of 10 per cent. solution H_2SO_4, then mix, and add drop by drop 0.5 per cent. water solution of metaphenylendiamine. If there is no oxydase, it stays without color. If there is an oxydase, there is formed trianinphenyline, which makes the solution strongly yellow.

Test for acid index. Should be ascertained as soon as specimen is delivered. Use 1/40 normal sodium hydrate solution in 5 ccm. buret. The degree of acidity is obtained by taking 5 ccm. of saliva and adding 2 drops of phenolphthalein solution, neutral, then drop by drop 1/40 normal solution NaOH, until a rose color is produced. Having noted on paper the number of ccm. of the NaOH in the buret before and after the rose color is obtained, the number of ccm. displaced multiplied by 20 and divided by 4 (in order to find the number of ccm. NaOH necessary to reduce 100 ccm. saliva), equal the degree of acidity. Normal being alkaline.

To attain a more accurate result add 1 ccm. of 1/10 normal HCl solution, and boil to drive off the CO_2; titrate as before and subtract the acid index of HCl from result.

Test for alkalinity. Proceed as above, substituting 1/40 normal HCl for sodium hydrate, and methyl orange for phenolphthalein, and titrate.

Ammonia or organic matter. Take 2½ ccm. saliva and 1 drop phenolphthalein solution and titrate it with N/40 NaOH solution to a feeble pink color. The used ccm. of the NaOH solution gives the acidity in relation to phenolphthalein. Take formalin and put in 1 drop phenolphthalein solution and titrate it with NaOH solution to a feeble pink color.

Now, both solutions are neutral or feebly alkaline to phenolphthalein; but if you put 1 ccm. of this neutralized formalin to the neutralized saliva the pink color disappears, because the ammonia is used up by the formalin. Now titrate a second time with N/40 NaOH until the reappearance of the pink color. This amount corresponds to the amount of ammonia. Multiply the ccm. by 0.017 and you have the percentage of ammonia in the saliva. Proof: 2½ ccm. and N/40 has the same relation as 100: N/1; therefore, the amount of grams in the amount of ccm. normal solution (instead of used N/40 NaOH solution) gives the percentage. Ammonia has the atomic weight of 17, therefore 1 ccm. normal solution corresponds to 0.017 per cent. and any amount of ccm. used must be multiplied by 0.017 per cent.

Sulfocyanate test. Use colorimetric scale (Eimer & Amend), 1 ccm. of specimen in tube A, 1 ccm. of 1: 2000 ammonia sulfocyanate in tube B; add 2 drops of 5 per cent. ferric chlorid to each tube, add aqua destillata until color in B matches that of specimen. Read scale in thousands and ten-thousands. Care must be taken to have the bottom of the meniscus on the line.

Chlorin. To 1 ccm. of specimen add 2 or 3 drops of potassium bichromate 1 per cent. solution; then titrate with N/10 silver nitrate solution until a light brick-red color is attained. Multiply the buret ccm. used by 0.3545. The result will show the amount of chlorin.

Urea. To attain the amount of urea, use a Ferris' modified Doremus ureometer, supplied by Eimer & Amend, New York. Tube A is washed with water and filled with hypobromite solution; close the stopper and fill tube B with 1 ccm. of specimen; open the stopper, allow specimen to enter tube A and close stopper. After all bubbles of gas have disappeared the reading is taken. The degrees marked upon the tube are divided into 0.025 and represent the number of grams or grains of urea contained in the amount of saliva employed. (The normal relation between the chlorin and the urea in the urine is 1: 2.)

Acetone. In 4 drops of specimen dissolve a crystal of potassium carbonate, then add a drop of Gram's reagent. An odor of iodoform indicates acetone. (Care must be taken not to confound the odor of iodin in Gram's reagent with that of iodoform.) To mount slide and examine with microscope for crystals of iodoform is best test.

Total solids and ash. To obtain total solids cleanse and weigh a platinum dish, into which place 2 ccm. of specimen. Dry in the incubator at 100° C. from two to three hours. Care should be taken that it does not turn too black. Weigh again, and add to this 2 or 3 drops of fuming nitric acid. Evaporate the acid and burn it white. Weigh again. The first gives the total of solids and the second the amount of ash.

NOTE A: To determine the percentage of chlorin in total solids, you multiply the chlorine by 110 and divide by total solids.

NOTE B: In urine the normal amount of chlorin is 15 per cent. of total solids. and it is reduced in pathological states.

In order to insure that this work may continue to progress, your committee recommends that the society take some action to supply funds for further research to produce findings that will be of practical value in the treatment of acid erosion, caries, pyorrhea alveolaris, and all the pathological conditions of the organ of mastication. In submitting this report we trust our efforts will not have been in vain.

Respectfully submitted,

H. C. FERRIS, *Chairman.*

Supplementary Report.

The undersigned member of the Committee on Research would beg leave to submit the following report of work accomplished during the year:

Your committee being handicapped in not having some definite object in view, and each member following a line in accordance with his own inclination, the writer followed the lines of bacteriology. He was greatly surprised at the frequency and the quantity of pneumococci found in the mouth, and would like to have some aid in following up the relationship between pneumococci in the mouth and pneumonia of the lungs.

While investigating the bacteria of the mouth, he became convinced of the presence of saccharomycetes in that organ, and cannot see why the yeast and mold fungi cannot both grow in the mouth.

He would recommend to the society that they suggest to the next Committee on Research Work that they make a special effort, and concentrate their work on saccharomycetes and actinomycosis during the coming year.

Yours very truly,

M. C. SMITH.

The Bleaching of Porcelain Fillings.

By L. E. CUSTER, A.M., D.D.S.

TWO years ago, before the Northern Ohio Dental Society, I stated that the longer a porcelain filling lasts the worse it looks. This is due to two changes that take place in porcelain inlays. One is the chipping of the brittle margins in exposed positions, and the other is the gradual change of color of many of these fillings. This change of color is one toward a lighter shade; the porcelain appears to lose its coloring matter; in short, we may say the filling has bleached. In most cases this change of color goes on slowly, but I have seen a few instances in which the porcelain has completely bleached out in three months' time. It might be said that the discrepancy in color between tooth and porcelain does not lie in the porcelain, but in a gradual change in the color of the tooth to a darker shade, thus making the porcelain filling appear lighter by contrast. But porcelain crowns placed in the same mouth at the same time, which we know do not change color and which originally matched the teeth, stand as valuable records to show that the natural teeth have not perceptibly changed in color.

The many years' use of porcelain teeth in vulcanite, crown, and bridge work, during which time our suspicion was never aroused as to any possible change of color in properly baked porcelain, have led us to believe that porcelain used in any manner whatever in the mouth would retain its color perfectly well. It was hard to believe that a material possessing the properties of porcelain should change color in time, but the discrepancy of color which I have seen in many cases, especially in porcelain inlays, shows to an observing eye that the inlay material does change color in time. The bleaching of the color, as I have observed it, only takes place in porcelain baked in a matrix. How inlays, which were inserted over twenty years ago, still retain their original color as far as the eye can judge. This would lead us to believe that all porcelain being practically of the same basic formula, the cause lies in the working and baking of matrix-made inlays—for we must exclude any effect of the matrix material upon the change of color of the porcelain, as the bleaching takes place in the mouth, after the matrix has been removed.

The effect of light, which is the best bleaching agent, was tried, in order to ascertain whether the change of color came from this source; if not, we must return and seek the cause in the working of the material itself. Six pieces of

porcelain, two of Jenkins', two of Brewster's, and two of Whites' high-fusing inlay material, were fused in the electric furnace. Of each material one specimen was under-fused, and the other was over-fused, in order that we might at the same time see what effect, if any, the state of fusion had upon the change of color. Incidentally you will notice the effects of different degrees of heat upon the porcelain, the higher heat producing a lighter color. These slides were then broken in halves, and one-half of each placed in the dark, while the other half was exposed to the sun for four months. These pieces were readjusted for comparison, and a close inspection will show that no change of color has taken place under the sunlight test.

This test would therefore exclude light as a bleaching agent of porcelain, and we must look for the cause of the change of color in the working of the porcelain at the time of its baking, and in the effects of the conditions found in the mouth.

On looking over my records it was found that those inlays which showed the most pronounced loss of color were of the low-fusing variety, whereas those which had preserved their color best were made of porcelains the fusing-point of which was higher than that of pure gold. This aroused the suspicion that these changes take place more rapidly in over-fused than in under-fused porcelain, for while I use a special furnace for each kind, I find it a very easy matter to over-fuse the low-fusing porcelains. It might be said that when they were set in the cavity, some of these inlays were of a lighter shade than intended. The difference in shade, however, was never so great as to necessitate the casting aside of the inlay. The inlay would possibly be one shade lighter, but never four or five numbers, as I have found some of the bleached inlays to be.

It is quite noticeable that all old porcelain fillings—except those with porous surfaces, which are superficially stained—are lighter than the tooth. Admitting that the tooth has darkened somewhat in time, the difference is too marked to be attributed entirely to the change of color in the tooth. The inlays which have noticeably changed color do not appear to possess the edge strength of others, and this leads us to suspect that the porcelain has not been properly baked.

So there is only this conclusion left: That the bleaching of porcelain inlays is due largely to under- or over-fusing of the porcelain. The material comes to us in the form of finely divided powder, each granule of which possesses all the color of the completed inlay. This color can be changed during the fusing to a lighter color by high heat, or it can be even entirely bleached out by being kept for a long time in low heat. What concerns us is the cause of the change of the color after the inlay has been properly matched and set in the tooth—the change to a lighter shade and in some cases the entire loss of coloring matter as time goes on. In a properly fused inlay, the granules of porcelain have been brought to such a heat that there is a complete coalescence of all the particles into a smooth and uniform product. In an under-fused inlay, the heat has only been sufficient to bring the particles into an imperfect coalescence. We would therefore conclude that the coloring matter has not been decomposed or in any way started toward decomposition. In an over-fused inlay, however, we have, after proper coalescence, a decomposition

of some of the ingredients of the porcelain which makes it porous, and at the same time the coloring ingredient has been changed to a lighter color. This decomposition and change in the coloring matter does not seem to stop when the filling has been set in the cavity, but having been started continues, owing to the conditions present in the mouth, until the inlay has lost all its coloring and has the appearance of a bleached inlay.

Discussion.

Dr. D. O. M. LeCron, St. Louis, Mo. I have given much time and thought to, and have experimented considerably with porcelain, and therefore read Dr. Custer's paper with much interest and pleasure. The bleaching of porcelain fillings after being placed in position I have not observed very closely, although I have noted quite frequently the fading away of the normal color in many cases, which I attributed, however, to the over-fusing of the porcelain.

After reading this paper, I concluded that in order to discuss it intelligently it would be well for me to investigate some of my own porcelain work, and see what ravages time had played with the material. I therefore called into my office several patients and inspected twenty-two porcelain inlays which had been placed in the teeth from two to nine years ago, respectively. I am gratified to be able to state that out of that number only two inlays showed any evidences of bleaching, one to quite a considerable extent, the other but slightly.

The one which had bleached out badly was placed in position seven years ago last March, and the other, which had slightly bleached, was cemented to place in September 1907.

Six years ago I placed two other porcelain inlays in the same mouth in which I found the badly bleached inlay, and found these other two inlays perfectly normal in color. In my judgment, the bleaching of the inlay in that particular case was due to over-baking, and the two that stood the test of time and held their color may be considered typical cases of perfectly fused porcelain.

I also noted a porcelain inlay which—according to the patient's statement—Dr. Richard Summa had placed some three years ago, and also four that my son, Dr. Robert LeCron, had made and set in April 1904, and to the credit of these operators time has not worked any change, nor has any other element set up a bleaching process.

After examining these twenty-seven porcelain fillings placed in the mouths for the periods named above, and finding that only two of them showed any evidences of bleaching, I concluded that the baking of the porcelain plays a great part in the problem of bleaching of porcelain fillings, and that it is to over-fusion that we must attribute most of the destruction of the metallic oxids which produce the definite colors in the porcelain bodies.

The many failures recorded in porcelain work can be attributed to the fact that so many dentists have rushed into this work poorly equipped, performing it in but a slipshod manner, not knowing the first principles of cavity preparation or the details of manipulation of the various porcelain bodies, and having no conception of the composition of the materials with which they work.

The working of porcelain and all the details of manipulation require a higher degree of skill than any other work which falls into the hands of the dentist. I am

quite positive that the bleaching of the porcelain can be attributed to the imperfect knowledge of its composition and want of skill in its manipulation.

The majority of operators who meet with failure in this field begin by doubting or depreciating themselves, or by losing confidence in their own ability to treat these cases.

My own many failures in this work proved to be an incentive to me to make investigations in order to learn the cause of these failures and a method of overcoming them. Three years ago I experimented on fusion and shrinkage, together with the crushing strength of the various porcelain bodies on the market, and made records of the results. From these experiments I reached the conclusion that correct fusion of porcelain is absolutely necessary in order to obtain a durable color and a reliable strength in the porcelain.

In making an inlay, it must, moreover, be borne in mind that with each baking the point of fusion of the porcelain is raised by at least 150° F.

So we find porcelain to be a most exacting material, and its correct manipulation must be learned by most exact and thorough experimenting.

It is to Dr. L. E. Custer's credit and honor that from his fertile brain the electric dental furnace has evolved, the greatest boon yet provided for the porcelain worker. He deserves great credit for the untiring work he has done for the dental profession, and I am sorry there are not more such conscientious and thorough investigators as Dr. Custer in our profession.

Dr. Custer (closing the discussion). I can only, in the limited time at my disposal, thank Dr. LeCron for the kind remarks made, and will not detain you with any further discussion of my paper.

SECTION I:

Prosthetic Dentistry, Crown and Bridge Work, Orthodontia, Metallurgy, Chemistry, and Allied Subjects.

Chairman—Geo. H. Wilson, Cleveland, Ohio.
Secretary—B. Frank Gray, Los Angeles, Cal.

SECOND DAY—Wednesday, July 20th.

Section I was called to order at 2 P.M. on Wednesday, July 20th, by the chairman, Dr. George H. Wilson, Cleveland, Ohio.

Dr. J. Lowe Young, New York city, was introduced, and presented a paper entitled "Deficient Development of the Arches of the Deciduous Teeth, and the Necessity of Early Treatment."

Dr. Young. I wish to say before I read my paper that I do not claim anything at all original in the methods outlined. There is a great deal of time wasted in discussion as to who did this or that thing first. I do not think that feature should enter into our work as professional men whose whole aim and desire should be the perfection of our methods and the dissemination of such ideas as we believe will be of benefit to the public and the profession.

[Dr. Young's paper here follows (see pp. 76–91).]

Deficient Development of the Arches of the Deciduous Teeth, and the Necessity of Early Treatment.

By J. LOWE YOUNG.

In order to be able to study pathology we must have some knowledge of physiology. In order to be able to recognize malocclusion we must be familiar with normal occlusion; so in order to recognize deficient development of the deciduous dental arches we must have a mental picture of these structures when normal.

NORMAL DEVELOPMENT OF THE DENTAL ARCHES.

At birth the proportion of the face to the cranium is as 1 to 8; in adult life it is about 1 to 2.

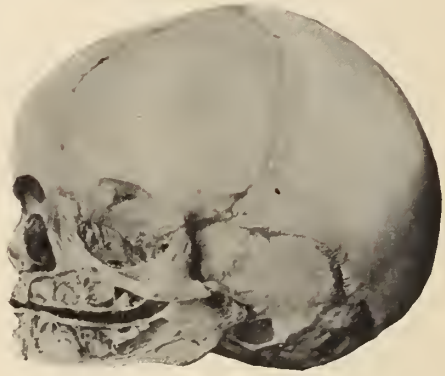
Froriep has also made observations on this point in older children, and finds the following proportions:

Proportion of face to cranium.	
Early infancy	1 to 8
Two years	1 to 6
Five years	1 to 4
Ten years	1 to 3
Adult female	1 to 2½
Adult male	1 to 2

The vertical diameter of the superior maxillary bone at birth is very short, the sockets of the teeth being close to, if not in contact with, the orbital plate. (Fig. 1—Noyes.) The same is true of the mandible in regard to its vertical dimension.

As development takes place, these bones, which are very vascular, increase in size at a rapid rate, so as to accommodate the developing teeth. This causes the face to increase in size more rapidly than the cranium during the period in which the deciduous teeth are erupting. At the same time a noticeable development of the nares takes place, which continues to increase until the eruption of the permanent teeth is complete.

Fig. 1.



The following, including Dwight's table, is from Rotch ("Pediatrics," 5th edit.): According to Disse, the nasal cavity begins to increase in height directly after birth, and goes on pretty rapidly until the beginning of dentition, when it becomes slow, until the second year is completed. After the first set of teeth has erupted, the growth is rapid until the end of the seventh year. The increase in breadth occurs in the last-mentioned period, which also is the time when the posterior opening doubles its

size in six months, remains stationary until the end of the second year, and then increases again. The following measurements were made by Dwight:

Age.	Height of posterior nares.	Breadth between pterygoid processes at hard palate.
About birth	6 to 7 millimeters.	9 millimeters.
From twelve to sixteen months	13 "	16 "
" twelve to eighteen months	15 "	16 "
" fourteen to twenty months	14 "	17 "
" eighteen months to three years	15 "	21 "
" twenty-two months to four years	15 "	20 "
About six years	16 "	20 "
From seven to eight years	20 "	22 "
About eleven years	18 "	22 "
At seventeen years—female	22 "	20 "

In the embryo the hard palate lies above the level of the mouths of the Eustachian tubes; at birth it has descended so as to be on a level with them. This descent continues until about the eighth year, when we find the hard palate considerably below the mouths of the Eustachian tubes. During this time the maxillary bones increase in length from before backward so as to accommodate the developing teeth and cause the flat face of the newborn infant to assume a better balance—in fact, we might say almost a perfect balance. We seldom see a very homely child at the completion of the eruption of the deciduous teeth.

Fig. 2.

It is obvious that any pathological condition which prevents development of

the nasal structures during the period of the eruption of the deciduous teeth is very likely to have a similar effect on the dental arches, and also that interruption of development of the dental arches will affect the development of the nasal structures.

We are all aware that there are twenty deciduous teeth, ten in each arch. They are usually in good arch alignment, and when fully erupted stand in close contact with each other. The age at which this stage of development is complete varies markedly; some children have teeth at birth, while others do not have any before the end of the first year. It is safe to state that children, as a rule, have complete deciduous dentures at from two to three years of age. (Fig. 2.)

THE ETIOLOGY OF MALOCCLUSION.

The fact that, with few exceptions, these deciduous dentures are in harmony both as to general form and size of the teeth is a strong argument against the idea of inheriting teeth too large for the jaws or jaws too large for the teeth. Who has ever observed in the deciduous dentures conditions at all similar to those found in the permanent set; of which Figs. 3 and 4, *a*, is a marked example? Fig. 4, *b* and *c*, shows results of treatment. The mother of this child, an intelligent and observing person, said that the child's deciduous teeth, while small, were in perfect arch alignment. If you have not found such conditions in the deciduous dentures—and I assure you that I never have—then it seems very improbable that they are due to heredity, but rather they point to deficient development from some cause or causes.

Fig. 5 shows models of a child of the same age as that shown in Figs. 3 and 4, with a similar arrangement of teeth and as pronounced a lack of development in the upper arch; but the lower arch is very different.

By studying these two cases a valuable lesson can be learned as to the etiology of malocclusion. The child whose teeth

Fig. 3.

are represented in Figs. 3 and 4 showed general lack of physical development; mentally she was very bright. The one whose teeth are shown in Fig. 5 was well developed physically, but deficient mentally. She had been troubled with acute rhinitis for a number of years.

It is not to be inferred from the above that heredity does not have any bearing on malocclusion, but rather that we should be most careful to try to determine, if possible, just what is responsible for conditions so abnormal.

In Fig. 2 we observed what the normal arches of the deciduous teeth should be when the full complement of teeth is fully erupted. Would this be a normal

arrangement for a child of six years? By no means. It is from just such conditions that permanent arches as shown in Figs. 3 and 4 develop, but fortunately in a less marked degree, as a rule.

Fig. 4.

a b c

From the time the deciduous teeth are fully erupted until the appearance of the first permanent tooth is a very important period in the development of the dental arches, and of the child generally. Unfortunately, normal development rarely takes place. The child of three years is supplied with teeth suitable to thoroughly masticate food, and he should be encouraged to do so, for by the vigorous use of these organs three times

Fig. 5.

a day the growth of bone and muscle is stimulated, and, if not counteracted by pathological conditions of some sort, should result in normal arch development.

CAUSES FOR MALFORMATION OF THE DENTAL ARCHES.

In general, it may be said that any cause which prevents the normal occlusion of the teeth at any time during the developmental period will tend to cause malformation of the dental arches. Among the causes which prevent normal occlusion may be mentioned mouth-breathing, inflammation of the bone or its periosteum, or of the pericementum, or conditions causing pain when the teeth are in contact.

Numerous habits, such as sucking the thumb or finger, biting the lip or the cheeks, or the nails, or the tongue, either the tip or the sides, lip habits of various kinds, and lack of tongue pressure on the maxilla due to mouth-breathing, are also factors which cause malformation of the arches.

Dr. F. B. Noyes, in the *American Orthodontist* for May 1908, says: "The jaws are endo-membranous in their origin, but very early in their development a periosteum is formed over the surfaces of the bone already formed, and from that time on, the growth of the bone as an organ takes place through the functions of the periosteum, together with the articular cartilages and the peridental membrane. By these tissues the bone is built up, but by the periosteum the surface is sculptured and molded into form, and by the osteogenetic tissues inclosed within the surfaces of the bone the internal structure is constantly being rebuilt so as to adapt the organ to the forces to which it is subjected, with the least possible weight. The more carefully this is studied, the more evident it becomes that bone is formed and reformed in response to mechanical stimuli, and that the entire surface is arranged in harmony with the mechanical stresses which result from the forces applied to the teeth and the surfaces of the bone."

Dr. Noyes sums up his entire paper by saying "The adult maxillary bones, which are such important factors in the beauty and harmony of the face, are the result of the sum total of all the forces acting upon them," and that "Normal occlusion is the agency by which these forces are distributed and preserved in balance."

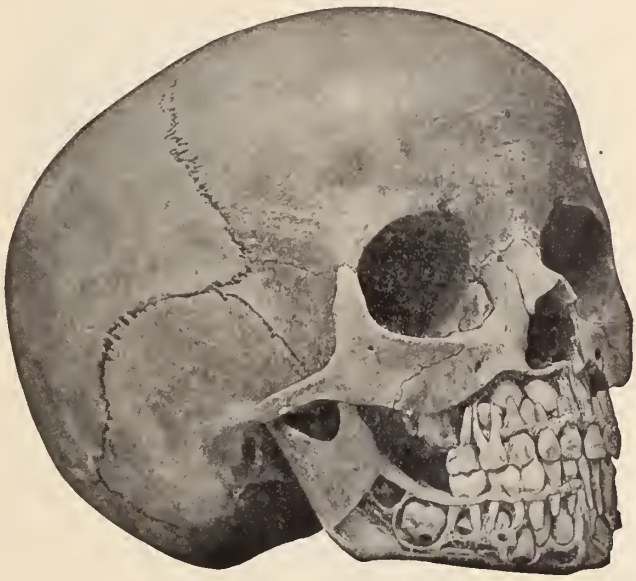
IMPORTANCE OF EARLY TREATMENT OF CARIOUS DECIDUOUS TEETH.

It is therefore of the utmost importance that the deciduous teeth should not be neglected and that caries should not be allowed to continue, for when decay reaches the point where mastication becomes painful the child is almost certain to form the habit of bolting his food, and this habit once formed is likely to persist through life. It is your duty to instruct mothers to bring their children early, so that they may become accustomed to having their teeth examined, and may become acquainted with their dentist. If this has been neglected so that the child's first visit is for relief of pain, the dentist should do as little as possible at that sitting. He should be most careful not to cause undue pain. It is surprising how much young children will endure if approached in the proper manner. Children are very imaginative and fond of fairy tales. So tell them that bad fairies have made a home in the tooth and that you are going to take them out and put good fairies in. Say

nothing about "not going to hurt." Avoid the use of the word "hurt" entirely. But rather say: "I got that bad fairy all but his toe," "I got that bad fairy all but his finger"—being careful to mention "bad fairy" each time you have to pause in your work to let the child rest a moment. Don't be in a hurry, and *never* deceive the child!

Whenever possible without overtaxing the child, cavities in the deciduous teeth should be filled with a durable material. When temporary work must be inserted, better results will be obtained, especially on the approximal surfaces of the molars, by using either gutta-percha or a combination of cement and amalgam.

Fig. 6.



—*Cryer.*

IMPORTANCE OF MASTICATION IN CHILDREN.

It might be well at this time to say a word to those medical specialists who advise mothers to so prepare foods that mastication is not required, giving as the reason that children of this age will not masticate. We are creatures of habit, and young children form habits far more quickly than their elders. When once the habit is formed of swallowing food without thorough mastication, it is difficult to overcome, especially when the older members of the family bolt their food. Children are apt to mimic those with whom they associate, and they do so in eating as in other things. If a child with a full complement of deciduous teeth which occlude properly is supplied with foods of such a nature that thorough mastication is a necessity before deglutition, he will soon establish the habit of masticating, and the pleasure of eating will be enhanced to a marked degree.

MODE OF ERUPTION OF THE PERMANENT TEETH.

By examining skulls we find that at from five to six years of age the crowns

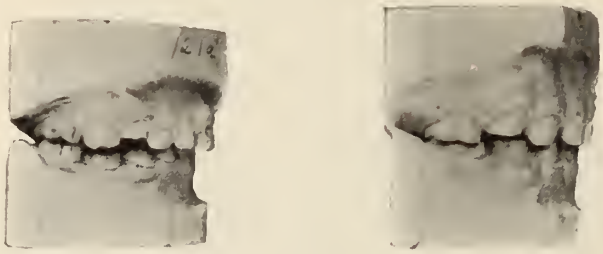
of the permanent teeth which replace the deciduous ones have all been formed and are lying in their crypts, the incisors and canines being lingual to the roots of their predecessors and the bicuspids between the roots of the deciduous molars. (Fig. 6—Cryer.) If there has not been sufficient growth of bone to accommodate these permanent teeth they are very likely to become displaced by pressure. In this stage of their development they resemble loose peas in a pod, and might almost be displaced by a sudden jar. The crowns of the first permanent molars are also formed and lie distal to the second deciduous molars. As subsequent development takes place and the root begins to form, the crown advances in the opposite direction from the growing root and will follow the course of least resistance.

In order that these developing teeth may have sufficient room, the maxillary bones must develop to quite a marked degree in three directions. The increase in width, at five or six years of age, should be sufficient to accommodate the permanent teeth that replace the deciduous incisors and canines. In other words, the distance between the mesial surfaces of the first deciduous molars in the arch curve should be as great, or a little greater, than the combined widths of the permanent incisors and canines. The increase in a vertical direction by six or seven years of age should be enough to allow the first permanent molars to grow to normal length before they occlude with their antagonists.

MALOCCLUSION DUE TO FAULTY ERUPTION.

It sometimes happens, but not often, that the first permanent molars will erupt to their proper height, and in so doing open the bite, leaving spaces between the deciduous molars. (Fig. 7.) There must also be a lengthening of the maxillary bones so as to accommodate the first permanent molars which are about to erupt, and also to give room for the second molars, the crowns of which are now formed.

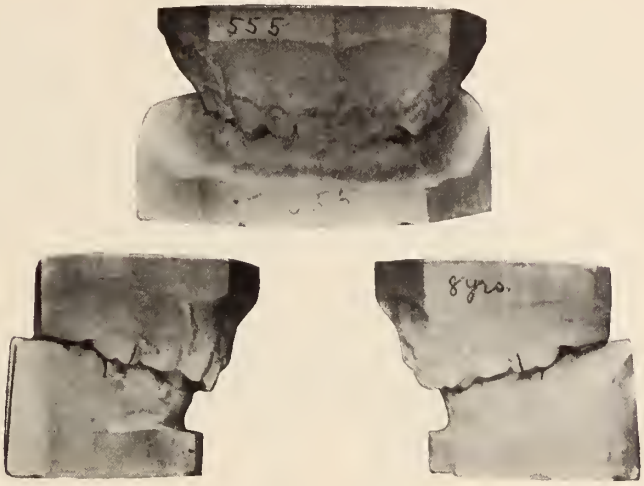
Fig. 7.



It is not uncommon to find distal occlusion of the lower teeth (class II) prior to the eruption of the first permanent molars; and we sometimes find, though less often, mesial occlusion of the lower teeth (class III) at this early age. Fig. 8 is made from models of one of the former, and Fig. 9 is from models of one that was undoubtedly in distal occlusion before the first permanent molars erupted. Both of these children suffered from adenoids and were operated

on at an early age, but nothing was said, either by the family physician or the

Fig. 8.



rhinologist, of the advisability of correcting the malocclusion or the facial

Fig. 9.

deformity; but an intelligent mother, learning of the advantages of early treatment of such conditions, placed these children under the care of an orthodontist.

Examination of these models shows that with both of these children the lower incisors impinged on the palate to such a degree that any attempt to masticate food was painful. The trained nurse who

had these children in charge reported to the orthodontist a pronounced improvement in the mastication of their food as soon as the treatment had progressed to the stage where the lower teeth failed to reach the palate.

Fig. 10.

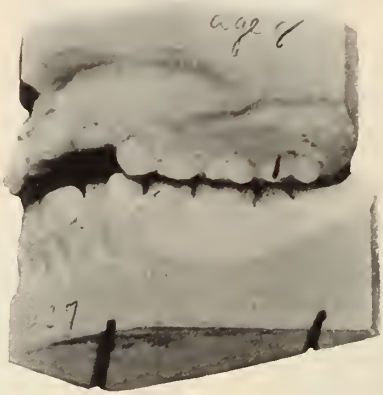


Fig. 11.

CONSEQUENCES OF DEFICIENT DEVELOPMENT OF THE MAXILLA.

Up to the seventh year of age the temporo-maxillary articulation is so imperfectly formed that the mandible may be displaced either forward or backward to some extent. Deficient development of the maxilla either in length or width may cause distal displacement of the mandible, if the influence of the inclined planes of the teeth favor such displacement, resulting in distal occlusion of the lower teeth (class II). It may be bilateral or unilateral according to the lack of development and plane influences.

Deficient development of the maxilla, when more pronounced, either in length or width, may cause the mandible to protrude, if such a result be favored by the

inclined planes of the teeth—for example, if the upper deciduous incisors, on

Fig. 12.

they increase in length their action on the lingual incline of the lower incisors

Fig. 13.

Fig. 14.

Fig. 15.

eruption, should just pass lingually to the incisal edge of the lower ones. As

would be to carry the mandible forward, and together with the adverse influence

of the inclined planes of the other teeth, would result in mesial occlusion of the lower—class III. Or if, owing to the lack of lateral development of the maxilla, combined with the lack of vertical development of the incisors, the deciduous molars on eruption meet their antagonists end to end, the mandible might be protruded so as to allow a better occlusion. And where the influence of the inclined planes is such as to carry the mandible to either side, the result would be unilateral mesial occlusion of the lower teeth, or a subdivision of class III.

Fig. 16.

Fig. 17.

CONSEQUENCES OF DEFICIENT DEVELOPMENT OF THE MANDIBLE.

Deficient development of the mandible in length, particularly of the rami, may cause bilateral distal occlusion of the lower teeth, class II. If the deficiency is confined to one ramus, the result would be unilateral distal occlusion, or a subdivision of class II. A child allowed to suck his thumb is likely to develop a distal occlusion on the side of which the thumb is a part. (Fig. 10.) When both thumbs are sucked at the same time or alternately, there will be bilateral distal occlusion. (Fig. 11.)

NECESSITY OF EARLY CORRECTION OF MALOCCLUSION.

With such evidence as that confronting us, it would be most unwise to advise parents to wait. Wait for what? It must be apparent that the longer such conditions are allowed to continue, the greater is the handicap—the more complicated the treatment, the more difficult the retention, the longer the period of retention on the permanent teeth, and

the less likelihood of sufficient growth of bone necessary for final success. If you were building a house and made a mistake in the foundation, would you advise waiting until the house was completed before rectifying your error?

It is the duty of those who treat malocclusion of the teeth to try to prevent the permanent teeth from erupting in malocclusion. Every member of the dental profession should be able to recognize the necessity of treatment of these conditions and should either prepare himself to treat them intelligently, or else turn them over to those who are proficient.

And let me say that the time is rapidly approaching when the laity is going to demand such services, and the dentist who is not prepared to render them or is not liberal enough in his views to refer the cases to one competent to do so is going to lose that portion of his *clientèle* having children who may require such services.

The accompanying pictures, made from photographs taken before and after treatment, are shown as proof of the improvement in appearance. [A short description was given of each case.]

Fig. 18.

Fig. 19.

Figs. 12 and 13 show profile and front views of a girl of eleven years of age before treatment was begun. This was a class II, division 1, case. Figs. 14 and 15 show profile and front view six months later, after the case was retained. Figs. 16 and 17 show profile and front views two years later.

Figs. 18 and 19 show profile and front views, before treatment, of a girl of eleven. This was a subdivision of class II, division 1, the child being a constant lip-biter. Figs. 20 and 21 show profile and front views six months later. Figs. 22 and 23, the same three years later.

Figs. 24 and 25 show profile and front views before treatment was begun, of a boy ten and one-half years old. This was a case of class II, division 1, with the lower anterior teeth striking the palate. Figs. 26 and 27 show profile and front views of the same boy nine months later.

Fig. 20.

Fig. 21.

Fig. 22.

Fig. 23.

Figs. 28 and 29 (previously published in *Dental Cosmos* for April 1909, p. 405) show profile and front views of a child six and one-half years old, before treatment was begun. This child had the full complement of deciduous teeth and had not yet erupted a permanent tooth. There was no malocclusion, but no spa-

Fig. 24.

Fig. 25.

Fig. 26.

Fig. 27.

cing in the incisor region to accommodate the permanent teeth. Figs. 30 and 31 (also taken from *Dental Cosmos* for April 1909, p. 405) show profile and front views of the same child a year later.

Fig. 28.

Fig. 29.

Fig. 30.

Fig. 31.

TREATMENT.

Plaster models. Before beginning treatment one of the first requirements is accurate plaster models made from good impressions. In children from three to six years of age fairly accurate impressions may be obtained with modeling compound, but as a rule this material causes more discomfort than plaster when properly used. Children are not accustomed to taking hot substances into their mouths, and a timid child is apt to be frightened by the heat necessary to render the modeling compound suffi-

ciently plastic. It must be admitted that it takes more time to procure models from plaster impressions, but the result is so far superior to that obtained by modeling compound that it is time well spent.

Recording photographs. Photographs are advisable and assist greatly in the study of the case and serve as a record, together with the models, of subsequent development.

Appliances. When fixed appliances are used in the treatment of these young children, they should be so constructed that little time is required for cementing them in place. It is not advisable to put more than one fixture in the mouth at one sitting, and at least one week should elapse before anything more is added. The appliances should be much lighter in construction than those used for adults. From No. 18 to No. 20 gage expansion arches have been found most efficient in the treatment of these young children.

Rotated teeth. Rotated teeth should be turned to normal position as early as possible, and it has been found very advantageous to have bands of various sizes prepared, so that when a bicuspid presents in a rotated position a band can be cemented on it with a spur properly placed so as to ligate and rotate the tooth before the root is thoroughly formed. Teeth rotated at this stage of development require but a few months of retention, but if left to adult life must be retained for many years to make certain that they remain in place.

Discussion.

Dr. H. A. Pullen, Buffalo, N. Y. In discussing this most timely paper, that of one whom I believe to be the ablest exponent of the modern methods of treatment of deciduous malocclusions, I wish first to call your attention to the fact that the essayist, in various portions of his paper, strongly emphasized the relationship existing between the causative factors involved in malocclusion and the treatment of malocclusion, pointing out the possibility of establishing conditions whereby normal development, not only of the dental arches but of the whole face, is possible after preventive treatment has been established.

In seeking after the causative factor in malocclusion the oral conditions in younger children have been studied, since it was thought, and rightly so, that as long as the cause for malocclusion did not seem evident at fourteen or fifteen years of age, it might have been noticeable at ten or eight or six or four years of age; or, if the causative factor became evident at fourteen years, the question would arise as to the date of inception of that causative factor, which again brings us back to the study of the conditions in the younger child.

Since these causative factors are found to exist at the age of from two to eight years, our patients come from the cradle to the chair, in a sense, and such preventive measures of treatment are instituted as will assure normal developmental conditions in the oral cavity and adjacent regions.

It may be possible that the family physician, or rhinologist, or ophthalmologist is called upon to assist in obtaining proper nutrition, unobstructed respiratory passages, and balanced and perfect vision, so that no pathological hindrance in the normal development of the child will arise.

In view of the fact that so large a proportion of children are affected with de-

ficient development of the dental arches and with deficiencies or abnormalities of the associated structure of the nose or throat or eyes, it would seem that the orthodontist, being often the first to diagnose these troubles, stands in a unique position in that he may, by treatment of deficient development of the dental arches and by reference to the specialist in associated fields, contribute more than any other specialist to the comfort, the health, and the beauty of the children of today.

From the orthodontist's standpoint, the treatment of deficient development of the dental arches has been fairly well defined, as is illustrated by the splendid results of treatment shown by the essayist. It remains for the dental profession, as well as the laity, to accept the results of these investigations, and to lend an impetus to the work of benefiting the children by orthodontic treatment and to the advancement of orthodontia as a science.

Dr. H. C. Ferris, Brooklyn, N. Y. In discussing Dr. Young's paper I wish to commend him for his compilation of vital factors from a sea of histological facts which particularly interest us in the diagnosis and treatment of the diseases of children. Orthodontia at this period of life demands the greatest care and consideration, also the highest degree of fitness in the operator, as the growing forces, if they could be measured, would astound us. An imperfect appreciation of these histological changes at varying periods would result disastrously. The essayist presents a very interesting scale of measurements by an eminent rhinologist. If these measurements were made upon subjects who were developing normally or whom the examiner had under observation for a long period, we can accept them as a standard, but if they represent an average taken without any orthodontic consideration, we can accept them only as interesting findings. That all the bones of the head are influenced in their development by use and disuse has been clearly stated by the essayist.

The author speaks of filling the deciduous teeth with plastic materials and suggests gutta-percha and cement. I must, however, disagree with him in the selection of materials. The expansion of the gutta-percha and the disintegration of the cement are unsafe factors, which can be eliminated by the use of amalgam or gold inlays and by a perfect restoration of the tooth's dimensions. I have no further criticism to offer, but must agree with all the vital points brought out by the essayist. I believe this paper is a good example for our future study of the detailed histological investigation that we must make to keep pace with nature and learn of her marvelous changes, in order that we may direct with our mechanical means those forces which make for health and normal development.

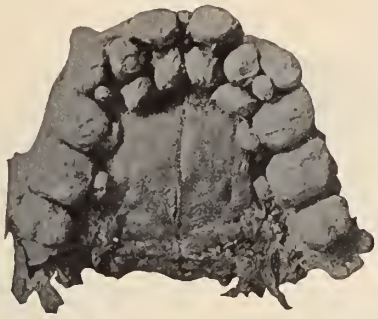
We need more papers of this description, which are valuable additions to our knowledge.

Dr. E. A. Bogue, New York, N. Y. I am glad to see Dr. Young and Dr. Ottolengui coming into line, and advocating early treatment when the arches of the deciduous teeth indicate such lack of developmental force that we know the incoming permanent teeth will not be normally arranged.

As Dr. Cronin of the New York Board of Health says, most babies are born all right, and start off toward normality, which is the most perfect form of the creature, be that creature man, lower animal, or vegetable. But this perfect normal development in babies is often

interfered with, often arrested, for a time at least, and that temporary arrest, due

Fig. 1.



to lack of strength at a given moment, may result in placing or leaving a mechanical obstruction to further development so difficult to overcome that nature, unaided, is not able to accomplish the task. Here, then, is where we come in to help nature by removing the obstacles that she could not overcome unaided.

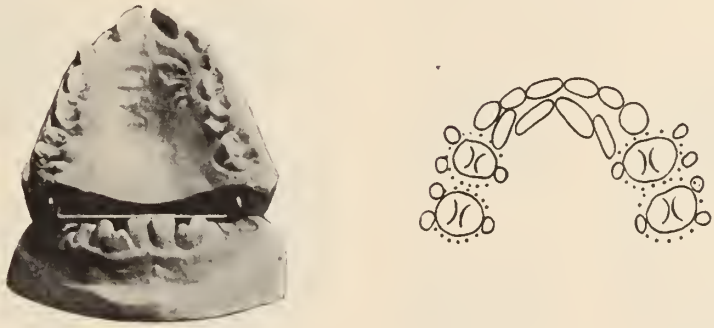
In searching for a cause of this cessation of growth we may find a cold, or whooping-cough, or coryza, that required all the powers of the system to overcome; or we may find some of the exanthematous diseases, measles, scarlet fever, rubeola, possibly smallpox; in a word, anything that disturbs the equilibrium of the circulation, and makes necessary a greater than usual supply of blood to a given part, temporarily diminishing the supply in contiguous parts, which accordingly suffer.

In trying to specify what we mean by lack of strength we are inevitably brought back to that great force-pump, the heart, which is the source of power in growth and development. Intimately associated with the heart is the breathing apparatus —any defects in which, should they occur, tend to delay development.

If the child cannot breathe freely he cannot run and enjoy athletic sports, and he is liable to be cut off from his more

Fig. 2.

Fig. 3.



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active associates, and so to fail to develop because of this deprivation.

This brings us to the tables of developmental changes with which Dr. Young has favored us. We cannot question that these are accurate or that they have been honestly compiled and are fair and true records of the material that was before the examiners; but these examiners did not realize that the majority, if not all of their material, was more or less abnormal.

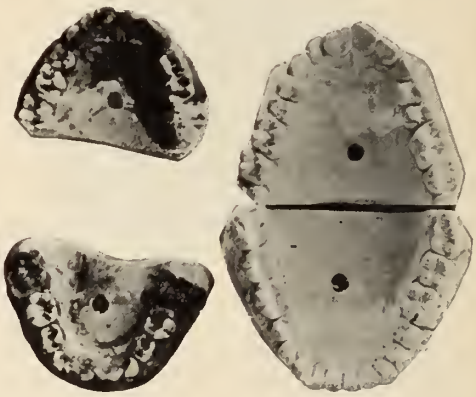
It will be necessary, as time goes on, to make entirely new tables, and it will be very difficult to secure such statistics as are adapted to normal conditions.

Dr. Young says in his paper, "If there has not been sufficient growth of bone to accommodate these permanent teeth, they are very liable to become displaced from pressure. In this stage of their development they resemble loose peas in a pod, and might almost be displaced by a sudden jar."

I feel like criticizing that remark. The crowns of the permanent teeth which replace the deciduous ones, as Noyes says, have all been formed and are lying in their crypts, the incisors and canines lying lingually to the roots of their predecessors, and the bicuspids between the roots of the deciduous molars. If these permanent teeth erupt without spreading the deciduous teeth, and come down in the positions that they have occupied in their formative stage, they will need no pressure other than the eruptive forces to be entirely irregular in their appearance, and I will show a diagrammatic chart that illustrates this condition. (See Figs. 1–3.)

The crowns of the permanent teeth are fully developed, so far as size is concerned, before they come through the gum. When they erupt, therefore, if the eruption is normal, they require as large an arch in regular development as the adult, the only difference between the normal arch of the permanent teeth

Fig. 4.



in a child and an adult being in vertical dimension, and in depth from front to rear. (See Fig. 4.)

Dr. Young, in quoting Noyes, says that "Normal occlusion is the agency by which

Fig. 5.

the forces acting on the maxillary bone are distributed and preserved in balance, and it is these adult bones that are such important factors in the beauty and harmony of the face."

As normal occlusion is the exception, not the rule, it becomes us to acquire and promote normal occlusion at the earliest moment.

Fig. 6.

Fig. 7.

An indication is here given of the way in which nature does not succeed, unaided, in acquiring normal occlusion when the strength of the body has been diverted from the regular order of development into the channels of repair, as I mentioned a few paragraphs back.

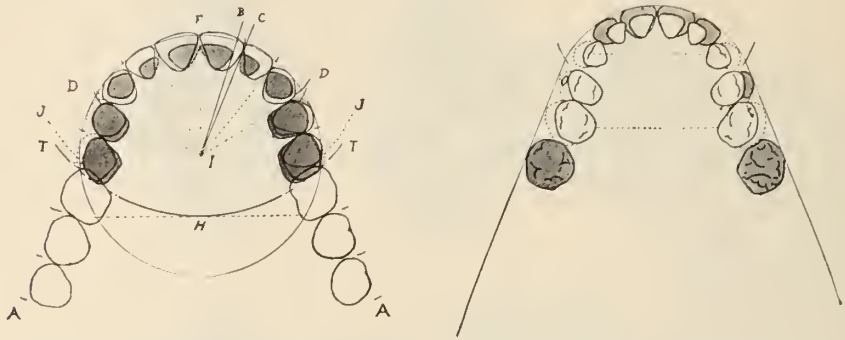
Dr. Young justly says that in order that these developing teeth may have sufficient room, the maxillary bones must develop to quite a marked degree in three directions: "The increase in width by five or six years of age should be sufficient to accommodate the permanent teeth that replace the deciduous incisors and canines. In other words, the distance between the mesial surfaces of the first deciduous molars in the arch curve should be as great or a little greater than the combined widths of the permanent incisors and canines."

The fact is, that these developing teeth do not as a rule get sufficient room, and we have as yet no means of determining the exact sizes of the arches to which we would willingly draw the deciduous teeth when we know these arches to be of insufficient size.

Fig. 8.

I have been able to procure thirteen specimens of deciduous arches, together with the adult arches of these same thirteen specimens. (See Figs. 5–8.) I am hoping from measurements of these specimens, and perhaps some others that I may have, to arrive at some conclusions that may be serviceable.

Fig. 9.



[For detailed description of the chart the reader is referred to the article by Dr. Varney Barnes, entitled "Evidence and Significance of Tooth Eruption," *Items of Interest*, 1909, vol. xxxi, p. 668.]

Dr. Varney Barnes showed at the Washington meeting of the Society of Orthodontists a diagrammatic chart (Fig. 9), which I here reproduce, but he writes me that he cannot as yet determine from the deciduous teeth and their arches what the permanent ones ought to be.

Among the causes which interfere with normal occlusion, Dr. Young enumerates mouth-breathing, and then inflammation of the bone or its periosteum. I would suggest that, before mentioning inflammation of the bone, he first mention caries of the teeth, which leads to sensitiveness, which if neglected is followed by exposure of the pulp, causing pain when the teeth are in contact, which leads to abscesses, and thence to chronic inflammation of the periosteum, which in its turn leads to necrosis.

The argument in favor of the necessity for early treatment may well embrace all those influences which tend to interfere with the perfect development of the whole body.

Dr. F. S. McKay, Colorado Springs, Colo. This paper is a specially timely and relevant one for the general practitioner. It is gratifying to see that the technical details of the correction of these anomalies are omitted. In a gathering of this sort, we should go directly to the fundamentals involved.

The subject of this paper is bound to be of interest to our rhinologist friends, as much so as to ourselves. It is becoming more and more evident that the rhinologist has found a valuable ally in the orthodontist, and the reverse is also true. That also places another duty and responsibility upon the general practitioner of dentistry, in that he must recognize the relationship between the development of the dental arches and that of the nasal fossæ and accessory sinuses, and must point out that relationship early, so that the child, if necessary, may have timely treatment that shall aim to-

ward bringing about normal development. It is, for many reasons which I need not enumerate, a well-established fact that the establishment of a normal occlusion of the teeth and a normal breathing-space is the ideal to be arrived at in these treatments; but back of all that, is it not a higher ideal, and one worth attaining, if we can prevent malocclusion to a great extent, and also lack of development of the nasal chamber?

There is no case of malocclusion in my estimation, however difficult it may seem when it is presented to us, that did not have a small beginning and a simple cause. So it is of the utmost importance for us and for the patient that the initial cause be pointed out, and treatment be instituted in the early and the simple stages.

As the essayist shows, and as the gentlemen who have preceded me have emphasized, unless some special influences interfere the development of the deciduous arches will be normal.

Among these influences, as has been mentioned before, adenoid growths, enlarged tonsils, and some habits of childhood, which the essayist also mentions, are most prominent. Malnutrition has also been mentioned as a frequent and no doubt important cause. But we may, as our studies proceed, find that malnutrition is only another name for dietary errors.

I do not know to what extent the essayist ascribes these anomalies to heredity —probably he goes about as far as I do; but I must say that I am coming more and more to the conclusion that heredity has very little to do with them. We have attributed anomalies to heredity because we could not define the real causes.

As far as heredity is concerned, I believe, as I think Dr. Brady has said, that what we really inherit is the normal. Nature intended us to have what is due us, and if we do not get it, we must look for the cause in some interference with nature's proper workings.

In regard to conditions in the deciduous arches, we used to think, perhaps more than we do now, that mesio-distal malocclusions had their origin in the eruption of the first permanent molar and its sequels; but I believe we shall find more and more that mesio-distal malocclusion has been already established in the deciduous denture, although I must say that I never have seen a class III case so established. But I have frequently seen cases of class II, of distal protrusion of the mandible, established in the deciduous denture.

In reference to lack of development of the deciduous arches, we find more and more that these are crowded and bunched. It has been an open question with me as to whether we were really justified in attempting treatment before the eruption of any permanent teeth. It perhaps will not take much more argument or experience to convince me that that ought to be done, and we may find it is essentially the proper thing to do. But I believe there is no excuse for letting mesio-distal variations of occlusion continue when they are well established in the deciduous denture, for reasons I need not enumerate, though I will mention the principal two: Inability to masticate properly, and, more especially, the facial distortion which such malocclusions are bound to result in.

Many factors combine in the deciduous denture to bring about serious malocclusion of the permanent teeth, as well as extensive caries, as has been emphasized. In my estimation, extensive caries of the deciduous denture is an inexcus-

able condition in modern dental practice, and with proper instructions to parents and to the little children, it may be and is prevented. Those of us who have ever examined any large number of children, in either the public schools or in charitable institutions, are shocked to find the conditions as they invariably exist, especially when we anticipate the condition in which the permanent denture will be.

Heredity surely is not to be blamed for these conditions. We must not wait until the permanent dentures are in place before advising correction. It is most embarrassing at times to all of us, after we have carefully demonstrated to the parents of our child patients the necessity of early treatment, and have pointed out to them the conditions that have been brought about by delay in treatment, to have the parent say, "My dentist advised me nothing could be done, the child was too young," or, "Nothing can be done now, I must wait until those permanent teeth come in." Unfortunately in such cases we cannot say anything that might convey our lack of respect for the advice of the general practitioner, as we do not wish to affect that patient's regard for him. But I feel that such advice is very wrong, and that the general practitioner has very little excuse for giving it, now, when our literature is full of just such papers as Dr. Young's, which point out distinctly the error of such advice. Fortunately, as the essayist has said, the time is coming rapidly when parents will ask some very embarrassing question of practitioners who persist in giving such advice.

Only the other day, I saw the case of a child of from fourteen to fifteen years of age, whose permanent teeth had all erupted except the third molars. The incisors were crowded and overlapped, the dentist having advised that nothing could be done until the permanent canine had erupted. He had failed entirely to see that the lower arch was distal. It was a case of class II, division 1. In the meantime the retrusion of the mandible had been progressing, the face was being weakened, and irreparable damage was done. I do not think that the development of the mandible could be secured by treating this case now. If the value of early treatment had been pointed out in time, the child's face would be entirely different at the present time.

I believe that our friend, the rhinologist, should understand these conditions as well as we do, but best of all, the general practitioner should be in full accord with the idea of early treatment.

Dr. S. H. Guilford, Philadelphia. The paper to which we have listened contains so much common sense and has so few points open to criticism that I can heartily congratulate Dr. Young upon his method of treating the subject. He is not a radical, neither is he a conservative, but he has taken his stand between the two extremes. I can thoroughly agree with him. One of the points that I wish to discuss briefly is the conditions which indicate to the practitioner that the deciduous arches need expanding, and which, when observed, should determine the question of their expansion at once. There is nothing in the whole domain of surgical care of the deciduous arches that is truer than that. Just as soon as we see that conditions are not normal, we must exercise our judgment and skill in order to set them right.

First of all the question arises as to when the deciduous arches will need expanding? In normal eruption the deciduous teeth come into their regular

predetermined positions because nature works along correct lines, and when not interfered with will do her work perfectly. Sometimes a little variation will occur, but as a rule there will be normal alignment. Why is it that nature produces an harmonious arrangement of deciduous teeth in nearly all cases? It is because, the infant having no teeth in the beginning, the deciduous teeth have an opportunity to come into their proper locations; there is nothing to interfere with their eruption in any way.

Many years ago, Sir John Tomes of London, in his "Dental Anatomy" described the case of a child who had lost all of the deciduous teeth before any of the permanent ones had erupted, and he considered it very remarkable that the permanent teeth should have subsequently erupted in their regular positions under those circumstances. On the contrary, I should say it was not remarkable, but that nature was merely working without any obstruction. There were no deciduous teeth to interfere with the permanent dentition, so the permanent set erupted perfectly.

When the deciduous teeth have taken their places in the arch, it becomes the duty of the dentist to conserve those teeth, to guard against the influences of caries, which when detected should be immediately eradicated and corrected. But those deciduous teeth should not be mutilated in form or contour; their entire diameters are needed to maintain the arch space, for if that space is not preserved owing to injudicious cutting or loss of a single tooth, one of the most necessary elements for the proper maintenance of space for the permanent dentition is lost. When the permanent teeth erupt they force their way into place, and the arch is enlarged by virtue of a certain stimulus, and if we could maintain the normal arrangement and number of the deciduous teeth, barring the effect of the diseases which the essayist has alluded to, the most important of which are adenoids, we should find the permanent teeth taking their proper places without any assistance.

I have referred to this feature of the paper merely to emphasize the importance of the preservation of the deciduous teeth, because, if they can be preserved in full size, contour, and health, very little will have to be done in the way of correcting irregularities of the permanent teeth.

In the latter part of his paper, Dr. Young speaks of the importance of the average practitioner making himself familiar with conditions causing irregular arrangement of the permanent as well as the deciduous teeth. That is the keynote of the whole subject. I have always tried to impress upon those with whom I have come in contact the importance of the general practitioner's studying this subject sufficiently to be able to understand the fundamental principles, so that when a case is presented he may be able by an oral examination to decide just what is needed, and to proceed accordingly. It is not necessary that every dentist should consume the time necessary to familiarize himself so thoroughly with the subject of orthodontia in all its bearings as to be able to handle all cases of irregularity which come to him in general practice. Many, and in fact the majority of general practitioners dislike orthodontia work, owing to the fact, perhaps, that they do not understand it and look upon it as an intricate science. But notwithstanding their repugnance, I consider it their duty to know enough about the subject to en-

able them to decide when corrective treatment is needed, and then, if the practitioner does not feel competent to undertake it himself, he can refer the matter of correction to the specialist.

This is bound to be the situation in the future. The specialists in orthodontia have come to stay, and will increase in number, so that in course of time there will be a sufficient number of men devoting themselves to this work to take charge of all cases that are referred to them. But their efforts will be assisted and the success of their operations greatly enhanced if the general practitioner will familiarize himself with the existing conditions, so that the work of the specialist may be begun promptly.

Dr. Young (closing the discussion). I wish to reply to one or two remarks that have been made; first to Dr. Ferris, in regard to the use of gutta-percha and cement. My paper did not treat of that subject.

Dr. Bogue spoke about the permanent teeth normally erupting irregularly, and he showed one slide and some diagrams illustrating that. One swallow does not make a summer, neither does one irregularity prove that the permanent teeth always erupt irregularly. I do not believe that the case shown was developing normally, nor do I believe that to be the normal way for teeth to erupt.

Dr. Guilford mentioned a case cited by Sir John Tomes, in which the deciduous teeth were lost very early and the permanent ones erupted properly, which he considered very peculiar—and I certainly agree with that view, for I do not believe that the same would occur in one per cent. of cases, if we were to remove the deciduous teeth say at three years of age. In order to bring about normal eruption of the permanent teeth there must be proper bone development, owing to the fact that the permanent teeth are much wider than the deciduous ones, and if there is nothing in the jaw to stimulate bone development a crowded condition of the permanent teeth will result. Dr. Guilford remarked that he never saw a class III case in the deciduous teeth. While I have never treated a class III case of malocclusion of the deciduous set, quite a number of such cases are on record. Dr. Howe has made a very careful observation of a child whose parents presented class III malocclusion, and the child, wishing to look like the parents, imitated them to the extent of protruding the mandible, and was rapidly developing a class III malocclusion. If Dr. Howe had not been a close observer, very likely this case would have been attributed to heredity, while as a matter of fact the child did not inherit the defect, but contracted it by mimicking his parents, and Dr. Howe by talking to the child was able to induce him to occlude normally. This case is one well worth careful consideration.

Regarding the question of beginning treatment before the eruption of any of the permanent teeth in class I cases, it seems to me just as logical as night follows day that when at the time of eruption of the first permanent molars there are no spaces between the deciduous incisors, there will not be sufficient room to accommodate the permanent incisors when they erupt.

Dr. Weston A. Price of Cleveland, Ohio, was next introduced, and read a paper entitled "The Laws Determining the Behavior of Gold in Fusing and Casting," as follows:

The Laws Determining the Behavior of Gold in Fusing and Casting.

By WESTON A. PRICE.

SELDOM if ever, in the history of the progress of dentistry, has so much confusion and uncertainty accompanied both the practical results of an important mode of procedure and the interpretation of the processes involved, as has attended the operations involving the fusing and casting of gold, and particularly the cast gold inlay. This confusion has been occasioned by the fact that the fundamental physical properties, first, of the gold itself, and second, of the accessories to its use, were not known to any branch of science; and the existing troublesome errors and the confusion attending their interpretation cannot be corrected until these physical properties are known, and the laws under which they operate are heeded.

THE VARIOUS METHODS OF MANIPULATING GOLD OR ITS ALLOYS IN CASTING.

It will be necessary for us to have very clearly in mind, while studying the laws underlying these processes, the physical conditions and procedures in detail that are made use of in the various methods of manipulating the gold, for they establish the fixed conditions with which we have to deal. These are as follows:

(1) The fusing of gold or an alloy of gold directly on to a higher-fusing metal, as in soldering a bridge with and without an investing medium.

(2) Taking an impression of a cavity or other surface in thin platinum foil, and fusing gold directly into it.

(3) Making a pattern of wax in the cavity and removing it and investing in some refractory material, and then, after burning out the wax, casting the gold directly into that cavity in the investment.

(4) Making an impression of the tooth cavity and surface beyond the cavity, and making a model in this of a material which is refractory enough and strong enough to cast directly on, after waxing up the cavity in the model, and investing the model and wax in a plaster and silica investment material.

(5) Making an impression of the tooth cavity and surfaces beyond the cavity as in the last method, then making a model of fusible metal or amalgam or sulfur, into which the gold cannot be cast directly, then making a wax pattern in that model, which is removed and invested as in the third method, and the casting made into the investment.

FACTORS OF ERROR.

Some of the confusing and conflicting effects are as follows:

First and chiefest is the decreased size of the gold reproduction due to its own contraction.

Second: It may be distorted, or unevenly decreased or increased in size.

Third: It may have a depression or hole in its surface.

Fourth: It may seem to be enlarged.

Fifth: It may be distorted or out of proportion.

These conditions have been caused by changes occurring in the materials involved in the procedure, and the methods of using them.

The variable factors that have a part in producing these possible errors are—

(1) Change in the dimensions of the impression or the pattern by the cooling when removing.

(2) Change in the dimensions of this impression or pattern material by change in temperature when investing.

(3) Change in the shape of the pattern due to the elasticity of the wax.

(4) Change in the dimensions of this investing medium in its process of setting.

(5) Change in dimensions of this investing medium in the process of heating, or heating and cooling.

(6) Effects of the wax or pattern material on the investing medium.

(7) Change in the investment dimensions from the pressure of the gold when casting.

(8) Action of the molten gold on the investing medium.

(9) Change in the dimensions of the gold with its change of state from liquid to solid.

(10) Change in the dimensions of the cooling gold.

(11) Distortion of the mold in the investing medium by the cooling gold.

(12) Stretching of the gold if held when cooling.

While all of these variable factors are essential contributors, to a larger or smaller extent, to the final error, none plays so important or large a part in the average technique as the change in the dimensions of the cooling of gold; and all efforts to determine the extent of error caused by the cooling gold, when any or all of these other variable factors are present, have apparently been not only unsuccessful, but extremely misleading, for the results have been the sum total of all the involved errors.

FACTORS OF ERROR IN THE TAGGART DIRECT METHOD.

To illustrate, let us follow *seriatim* the steps of the Taggart direct method technique. The wax for its pattern is put in the cavity at its workable temperature, which will be for the various inlay waxes from 95° to 130° F. It is cooled in the cavity, to render it firm and strong, to about 67° F., and in so doing it contracts, according to its formula, one or two per cent. of its lineal dimension. If invested at this temperature an error of this definite amount is already carried forward, to appear in the final inlay, unless it be corrected by some other step. If the wax of the pattern, when being formed and cooled, surrounds the tooth structure, covering outside dimensions, it will be stretched as it cools, and it would by so stretching apparently correct part or all of the error of contraction from cooling; but all waxes have elasticity and hence do not remain stretched, which introduces a new uncertainty or error to change the accumulated error. When the wax pattern is invested, its temperature will determine partly its dimension, for on heating from 67° F. to 100° or to

130° F., the wax will be expanded, and if not carried to the softening point at which surface tension will distort it or where the investment will change its shape, part or all of the accumulated error due to contraction of the wax may be corrected, and with a certain definite technique to be explained later, even an error of expansion produced. The ordinary technique will not show the true expansion. Heating the pattern to enlarge it will release its elasticity and allow much distortion.

In the next step, of heating the investment material, if it be of the best quality we may have an expansion of about one per cent., or if of poor quality we may have a contraction of two per cent., according to our manipulation, and if the investing compound is soft and yielding it can be distorted easily by the pressure of the gold when casting, thus causing an error which is not a uniform expansion.

When the molten gold is forced into the investment, its physical state changes from liquid to solid, and here we have what has heretofore been an entirely unknown factor, but which we will show later to be a very large contraction; and again, on changing temperature from its freezing-point and cooling to normal temperature, it contracts, as the writer has previously shown, over two per cent. (*Items of Interest,* May 1908.) This contraction can be partially controlled by pressure on the congealing gold, thus forcing gold from the sprue, and partially by holding the gold as it contracts, *i.e.* by causing it to surround a strong form, thus preventing the normal contraction.

The relation of the size of this final casting of gold to the original cavity in which the wax pattern was made may thus vary through a wide range, and the final error is the sum of all the plus and minus changes made in the size of the record of the cavity, as it passed through the different materials and processes. We will show definitely the amount of change produced by each step.

BEHAVIOR OF THE INDIVIDUAL MATERIALS USED IN CASTING.

To work intelligently we must therefore know the behavior of the materials used for each step, and make the unfixed or variable changes correct the fixed changes. The great fixed change is the contraction of the gold both as it changes its state and as it cools to normal temperature, and these changes will have the largest consideration in this paper, but the other factors are essentials, and must also be definitely established for the fixing of fundamental rules of procedure. We will take them up in sufficient detail in the order of their occurrence in the technique of procedure.

The making of relatively exact determinations requires instruments of very great precision. The writer has had several constructed especially for this research work, and has had very great assistance from Prof. Dayton C. Miller, professor of physics in the Case School of Applied Science, whose services he was fortunately able to engage, with the use of very special instruments of precision for the most complicated of these determinations.

FACTORS OF ERROR INVOLVED IN THE IMPRESSION OR PATTERN MATERIALS (WAXES).

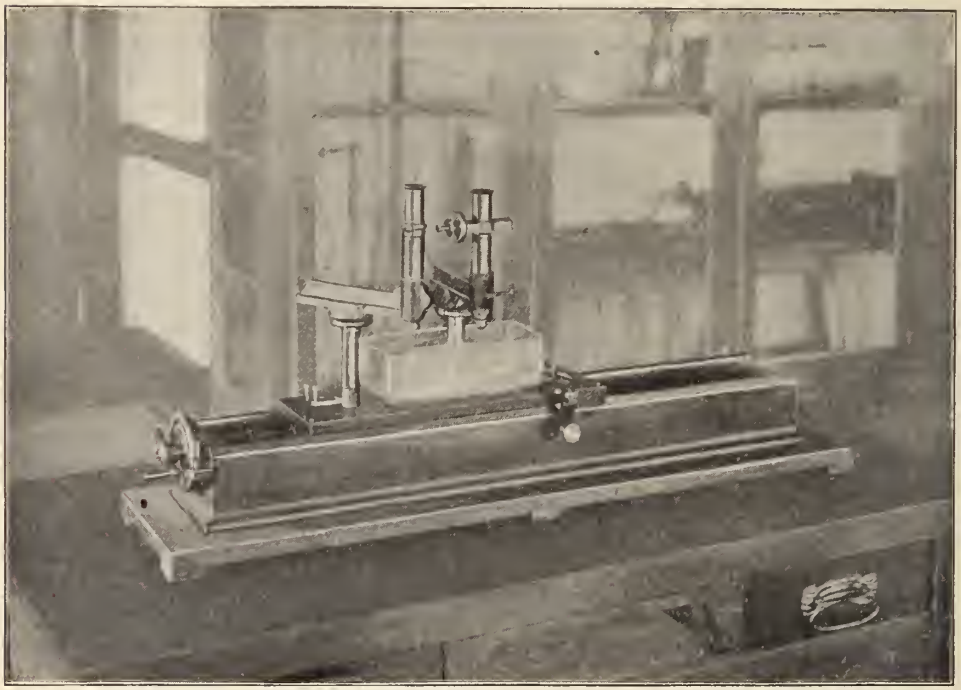
We will study the materials and uses in their order of sequence. First: The

change in the dimensions of the impression or pattern material by cooling when being removed from the cavity. Practically all the kinds of impression or pattern material used for inlay work for carving in the cavity have about the same qualities, and the working range in temperature varies according to the base used in largest proportion in their manufacture.

The carving waxes are not best adapted for taking impressions for any of the model methods. The following waxes purchased in the open market, and the base waxes chiefly used in them, have been carefully tested for their expansion co-efficient, working range, and total expansion from 67° F., room temperature, to their maximum working temperature: Bird & Moyer, Cleveland Dental, Klewe's, Consolidated, Peck's, Price's for Stone Model Method, S. S. White black, S. S. White Crown Sticky-wax, Standard, and beeswax, gum damar, paraffin, stearic acid, bayberry, canawba, and cerecin.

The rate of expansion of all waxes changes rapidly with increase of temperature, but at different rates for different base waxes and different formulæ or mixtures. This made it necessary to determine very close steps for all the waxes. This was done by two methods, one by measuring the expansion directly with a microscope comparator (shown in Fig. 1). The wax bar is heated in a water-bath and the distance between the pilot points or hair lines that are placed on the wax bar is measured by micrometer

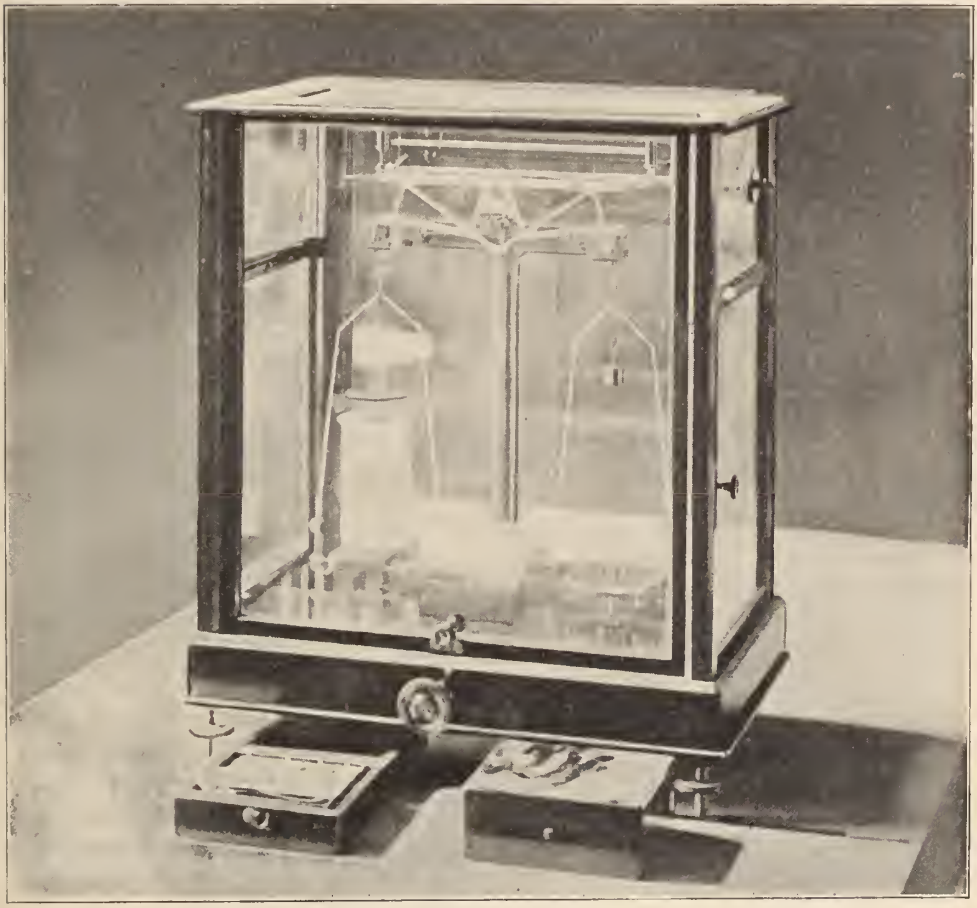
Fig. 1.



Microscope comparator arranged for measuring expansion of wax.

screws, these carrying two microscopes which are focused on them. The other method was by measuring the density of the waxes at various temperatures, which gives the volume expansion. The linear expansion is one-third the cubical expansion. Fig. 2 shows the small balance arranged for these determinations. The weight of the wax was measured, while suspended in the beaker of water, at different temperatures. Table I gives the linear expansion, in thousandths of an inch, and the density at various temperatures Centigrade of the various waxes. Table II gives the working ranges of the various waxes and the changes in their dimensions, in thousandths of an inch, with changes of temperature Fahrenheit. This table is a very valuable one, inasmuch as it gives the key to much of our error. The lower or minimum working range of temperature of the various waxes can be modified slightly by working the wax. The maxi-

Fig. 2.



Small balance arranged for measuring density of wax and gold.

TABLE I.

Expansion and Density of Waxes.

Linear expansion (E) in thousandths of an inch, at various temperatures—Centigrade (t) and Fahrenheit (T. F.).

	Price's Impression Wax.		Cleveland Dental Special Carving Wax.		Consolidated Dental Mfg. Co. Casting Wax.		Peck's Gold Inlay Wax.		Bird & Moyer Inlay Wax.		S. S. White Inlay Model Wax.		Standard Inlay Wax.		S. S. White Crown Sticky-Wax.		Klewe.		Damar.		Beeswax.		Japan Wax.		Paraffin.	
	Brown.		Green.		Black.		Red.		Blue.		Black.		Gray.		Pink.		Red bar.									
	Density at initial temperature—19.4° to 20.0° F.:																									
	1.033		*0.915*		*0.901*		*0.951*		*0.943*		*0.971*		*0.962*		*1.025*		*0.927*		*1.040*		*0.968*		*0.990*		*0.937*	
T. F.	t	E	t	E	t	E	t	E	t	E	t	E	t	E	t	E	t	E	t	E	t	E	t	E	t	E
67	19.7	0.	19.5	0.	19.4	0.	19.5	0.	19.5	0.	19.5	0.	19.5	0.	19.5	0.	19.7	0.	19.8	0.	19.8	0.	19.9	0.	20.0	0.
87	30.8	3.3	29.3	4.9	30.1	6.2	29.9	5.8	29.6	2.8	29.6	11.6	29.4	3.3	29.3	1.0	30.6	2.2	30.4	0.9	30.2	3.5	30.3	3.0	30.2	5.3
95	35.1	5.9	34.4	10.2	35.5	10.7	35.1	8.6	34.7	7.5	34.6	15.4	34.5	6.4	34.3	2.2	35.0	4.9	34.8	1.8	34.6	4.8	34.4	4.5	34.4	8.8
105	40.7	8.2	40.4	11.7	40.3	13.1	40.1	10.7	39.6	10.1	39.6	17.0	39.5	8.9	40.0	4.9	40.5	7.6	40.1	2.7	39.8	7.5	39.6	6.5	39.4	11.8
113	45.0	Soft 10.4	44.3	13.0	45.0	16.4	44.8	14.7	45.6	14.9	45.1	21.1	44.6	12.4	44.1	8.1	44.8	12.0	44.1	3.4	45.0	12.0	44.8	10.7	44.4	16.0
122	50.0	Melted	50.6	23.1	50.4	19.7	Crumbles 50.0	27.1	50.1	24.8	49.6	31.0	49.2	22.7	49.9	13.9	50.9	15.6	50.1	3.8	49.7	18.0	49.5	Crumbles 19.5	48.5	Soft 22.8
131	. . .	. . .	Crumbles 53.1	35.2	Crumbles 54.9	27.9	. . .	. . .	Crumbles 54.4	36.5	Crumbles 53.8	41.3	Crumbles 54.3	30.5	Bends very easily 52.5	14.8	54.8	20.7	53.3	4.2	54.2	24.5	. .	. . .	50.0	Too soft to handle
134	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	56.7	24.5	57.9	4.9	55.9	28.0	. . .	. . .	. . .	. . .
140	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	Crumbles 59.7	28.8	60.3	5.8	Crumbles 59.0	32.5	. . .	. . .	. . .	. . .
147	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	64.3	6.7	. . .	. . .	. . .	. . .	. . .	. . .
150	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	66.0	5.8	. . .	. . .	. . .	. . .	. . .	. . .
156	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	Flows 69.9	5.8	. . .	. . .	. . .	. . .	. . .	. . .

TABLE II.

WORKING RANGES OF IMPRESSION WAXES, AND THE CHANGES IN THEIR LINEAR DIMENSIONS WITH CHANGES OF TEMPERATURE.

NAME.	WORKING RANGE.		LINEAR EXPANSION AND CONTRACTION PER INCH IN THOUSANDTHS, ALSO AS PER CENT.						ELASTICITY CHANGE OR RETURN OF BEND AFTER HEATING TO HIGHER TEMPERATURE.	
	Minimum temp. in ° F.	Maximum temp. in ° F.	Contraction from lowest working range to 67° F.		Expansion from 67° F. to highest possible working range.		Difference or maximum possible excess of expansion over contraction.		½ inch bend.	1 or 2 inch bend.
			Thousandths.	*Per cent.*	*Thousandths.*	*Per cent.*	*Thousandths*	*Per cent.*		
Bird & Moyer inlay wax . .	107°	130°	12	1.2	36	3.6	24	2.4	50 per cent.	50 per cent.
Cleveland Dental inlay wax .	109°	128°	12	1.2	35	3.5	23	2.3	50 " "	62 " "
Klewe's inlay wax	115°	139°	12½	1.25	28½	2.85	16	1.6	50 " "	60 " "
Consolidated inlay wax .	115°	131°	15	1.5	28	2.8	13	1.3	50 " "	50 " "
Peck's inlay wax	112°	122°	14	1.4	27	2.7	13	1.3	75 " "	50 " "
Price's for stone model method	98°	113°	6	0.6	10	1.0	4½	0.45	25 " "	10 " "
S. S. White (black) inlay wax	115°	129°	23	2.3	41	4.1	18	1.8	50 " "	50 " "
S. S. White (crown sticky) inlay wax	106°	126°	10½	1.05	15	1.5	5½	0.55	50 " "	40 " "
Standard inlay wax	110°	135°	11	1.1	31	3.1	20	2.0	50 " "	50 " "
Beeswax	94°	138°	5	0.5	32½	3.25	27½	2.75	. . . . .	. . . . .
Gum damar	melts at	160°	. .	. .	. .	. .	. .	. .	. . . . .	. . . . .
Japan wax	"	122°	. .	. .	. .	. .	. .	. .	. . . . .	. . . . .
Paraffin	100°	120°	10½	1.05	22½	2.25	12	1.2	. . . . .	. . . . .
Stearic acid	melts at	150°	. .	. .	. .	. .	. .	. .	. . . . .	. . . . .
Canawba	"	205°	. .	. .	. .	. .	. .	. .	. . . . .	. . . . .
Cerecin	"	122°	. .	. .	. .	. .	. .	. .	. . . . .	. . . . .
Bayberry	"	134°	. .	. .	. .	. .	. .	. .	. . . . .	. . . . .

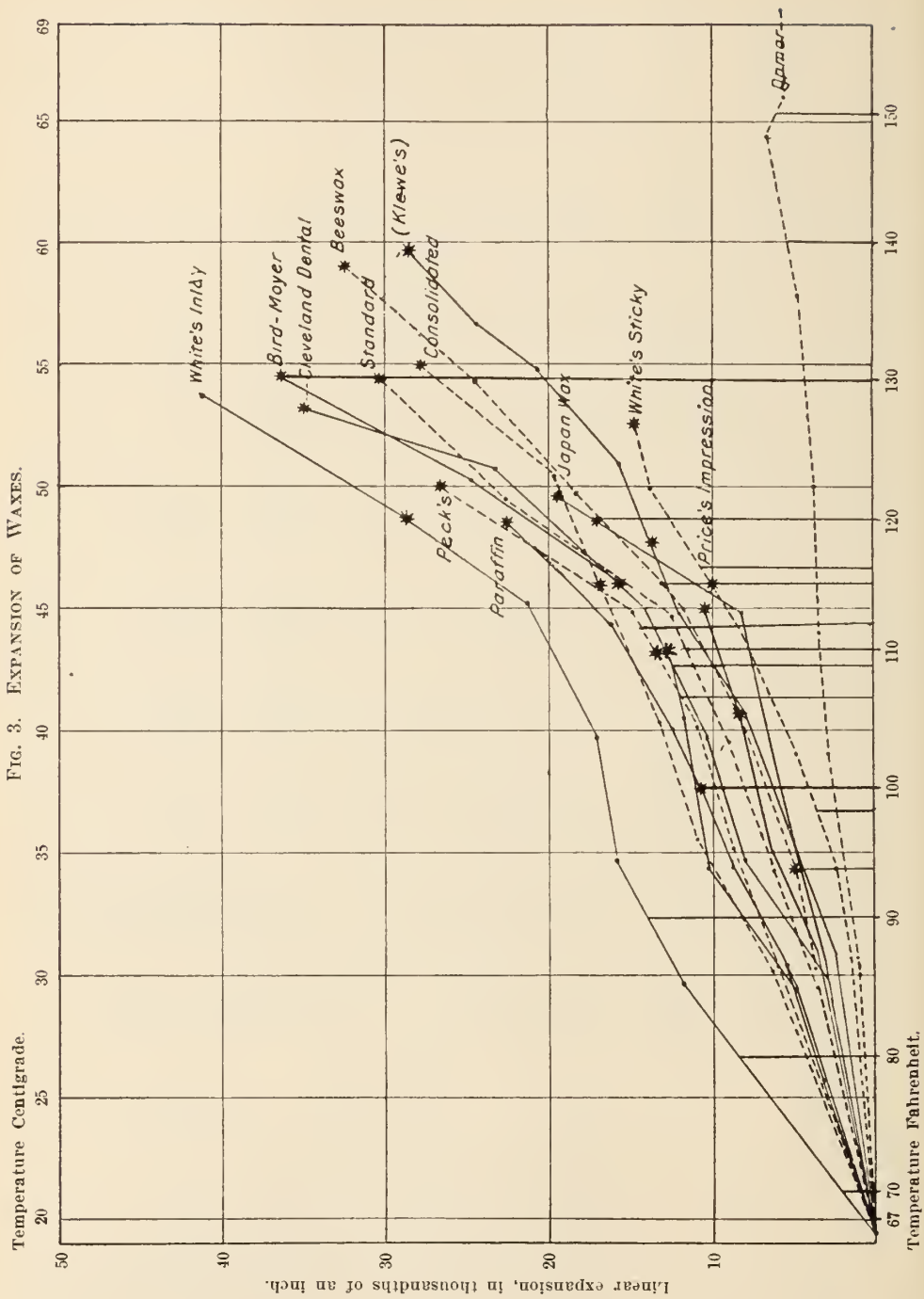


Fig. 3. Expansion of Waxes.

mum temperature is usually higher than that at which a frail pattern of wax could be handled and keep its shape, though a block of it could. In Table II the inlay waxes of the market are arranged alphabetically. It also shows the elasticity when a bar of wax is bent one inch, also one-half inch, at its lower working range, and chilled, then heated to the upper working range, when it will return nearly to its former position. If a wax, say the first one, be placed in a cavity at its minimum working temperature, 107° F., and cooled down to 67° F., it will contract 12/1000 of its linear dimensions, or 1.2 per cent., which will be the error carried forward if it be invested at this temperature. If, however, it be heated at the time of investing, and placed in an investment at 130° F., its maximum working temperature, it will expand 36/1000, or 3.6 per cent. The latter dimension is 24/1000, or 2.4 per cent., larger than when the impression wax was in the cavity. And so the behavior of all other waxes is indicated. This would seem to be a means for correcting, by compensation, all of our difficulties due to the contraction of the gold, but it does not, as will presently be shown. Fig. 3 shows diagrammatically the exact expansion of all the different waxes from 67° F., or its equivalent 20° C., to any temperature up to the limit of its working range. It also shows graphically the relative behavior of all the different waxes tested. The base line, reading from left to right, indicates the progressive increase from 67° in temperature in units Fahrenheit, and the top the corresponding temperature in units Centigrade from 20°. The elevation of the curve as shown by the figures on the left side reads the linear expansion, in thousandths, of its dimension, or can be read in hundredths, as per cent., by leaving off the second cipher. From this chart can be seen at a glance the exact change in dimension of any of the waxes between any two temperatures between 67° F., and its working limit. All waxes are taken as zero dimension at 67° F., or 20° C., temperature. It will be noted how the increase in the rate of expansion with the increase of temperature is shown by the lines deflecting upward more rapidly as the temperature increases. These determinations are made on samples of cast wax, to avoid the errors of elasticity which form the most treacherous error we have to contend with, and which I fear that few have either suspected or recognized. If you will take a bar of any of the above waxes, warm it in a bath to its working temperature, bend it and hold while chilling, and when it has become thoroughly cold release it, you will find that it will apparently remain bent. Upon being very slightly warmed, however, it will straighten again. Most of the above waxes are too brittle to allow of bending a straight cast bar into a hoop, but even the brittle ones have a large elasticity. If a bar or stick of the Cleveland dental inlay wax be warmed enough to bend into a circle until the ends touch, then chilled while held, and then warmed again, it will straighten one-third of the way to straight; and if again bent till the ends meet, chilled, and then warmed, it will straighten over 70 per cent. of the last bending. S. S. White sticky-wax will, when treated in the same way, straighten 79 per cent. of the distance of the second bending. The brittle carving waxes are Peck's, S. S. White, Bird & Moyer, Standard, and Consolidated, and all these have a large elasticity. When a stick of each, three inches long, is bent one-half

inch from straight, held while cooling and then released, it will straighten again, usually about half way to straight, but this differs with the different waxes and temperatures when bent. The last column of Table II shows the amount, expressed in percentage, of the elasticity or return of wax bars bent both one-half inch and either one or two inches, as they would stand—for the brittle carving waxes would break before bending two inches.

The error that is possible from this source is enormous, and it will always be a distortion, not a uniform expansion or contraction, therefore it cannot be corrected by another step. For example, see Fig. 4, A and B. If two wax bars of Cleveland dental inlay wax, or of almost any wax on the market, are heated to the lower working range, one being pulled or stretched while chilling and the other pushed endwise or compressed (both just as the wax could be in a cavity) each then being chilled while held, and then carved to be identical, they represent the same size and form—in this case one inch in length. If while chilled they had been placed in the cold investment, attached to the same sprue and cast, the bars would be identical, but when simply the change was made of placing them in a warm investment at their upper working range, and they were then cast, the difference in their length was 0.185 of an inch, or a variation of 18½ per cent., for the warming will release the elasticity, and thus the stretched bar will shorten 0.1, or 1/10 in., and the compressed one will lengthen 0.085, or 85/1000 in. Each will change its length by 10 per cent. or nearly so. These bars so treated and cast are shown in Fig. 4, showing A the wax before and B the metal after investing and casting.

This is a source of exceedingly large error—and it is not necessary that the wax be placed in warm water as in a warm investment, for even the warm summer temperature or that of a warm room is sufficient. For example, two bars of a commercial inlay wax were taken, and one was stretched and the other compressed endwise, at the lower working range, and chilled while held. They were then cut to the same length, namely, 4.31 in., and attached to a card and left in a warm part of the room over night, and were measured when cold in the morning. The stretched one was shortened 0.25, or ¼ in., or 6 per cent., and the compressed one was lengthened 0.19, or 3/16 in., or 4½ per cent. These are shown in Fig. 4, marked C, before, and D, after warming.

This part of the paper should embrace a more extended review, but space will not permit of it. Anyone can make these and other simple experiments to demonstrate that the elasticity of the wax may be and is a vary large source of error, especially in hot weather. When wax is melted into a form or chilled from the liquid state without pressure, its elasticity is negligible on warming again, though its original contraction is enormous. A comparison of patterns made both in cast wax and in worked or stretched wax is essential here, also a study of the effect of stretching the wax over a form (as in a double compound cavity), and the conflicting of the forces of expansion and elasticity, which are beautifully demonstrated as follows: If a bar of wax be heated and thus expanded, and then fastened to make it retain that expansion (as when a warm wax pattern is made by the direct method in a double compound cavity—a mesio-occluso-distal cavity in a molar), and

then cooled, the wax will be stretched owing to being held in each case, and if chilled and kept chilled will remain frozen in that position, but if warmed will not expand from that position, but will contract, owing to its elasticity, a large part of the amount to which it has been stretched. Let us make two bars of wax, an inch long—of, for instance, Cleveland dental inlay wax—precisely alike in cold dimension except that one is carved directly from the cast wax stick and the other from a piece of the same wax that has been worked when warm and stretched as it chilled. The pattern pieces are then attached to the same sprue gate and invested together in an investment of plaster and silica at a temperature of 128° F. The piece cut from the unworked cast wax will expand 35/1000, or 3.5 per cent., and the other will, while expanding, contract endwise the amount of its elasticity, an even greater amount. If after burning out the wax we cast pure gold into them both at the same time, we shall have bars differing greatly in length, though the wax patterns from which they were made were identical. One test of the above produced a bar of gold from the unworked cast wax 27/1000, or 2.7 per cent. longer than the pattern, and the other 67/1000, or 6.7 per cent. shorter, from the bar of worked and stretched wax. The volume of the two pieces of wax remained the same, but the shape of the wax did not.

The only wax of the above tested waxes (see Tables I and II and Fig. 3) that has not a large expansion and contraction is that suggested by the writer for taking impressions for the stone model method of procedure. It also has an exceptionally low proportionate elasticity, about one-tenth of that of carving waxes. The contents of the Price impression wax are pure—

White gum damar,	110 parts
Tamarack (*hackmatack*),	10 "
Beeswax (pure),	15 "
Paraffin,	10 "
Stearic acid,	2 "

—melted together in the order named and kept free from water. It should be used as cool as possible with wet fingers,

Fig. 4.

A B C D

Two similar wax bars placed in a warm investment and cast. A, Before heating. B, After heating.

Two similar wax bars, showing elasticity distortion when heated. C, Before heating. D, After heating.

and only the surface warmed soft when using.

It is not a carving wax, but an impression wax, and is used to take the impressions in which the hard stone models of the cavity are made, and the near tooth surfaces of the same and adjoining teeth, for this model method. Its total volume change from temperature is only from one-quarter to one-half that of the various carving waxes. Its virtue consists in its not introducing much error either from contraction or from elasticity. When an impression is taken with it at its working temperature of 98° F., and is cooled to 67° F., the contraction change is only 0.6 per cent., whereas if the same impression were taken with S. S. White black inlay wax, the contraction would be 2.3 per cent., which error goes forward in each case if the model or pattern is placed in the investment material at that minimum or room temperature of 67° F. Under these conditions the contraction error carried forward by each of the waxes would be as follows: Bird & Moyer, 1.2 per cent.; Cleveland dental inlay, 1.2 per cent.; Klewe, 1.2 per cent.; Consolidated, 1.5 per cent.; Peck, 1.4 per cent.; S. S. White black inlay, 2.3 per cent., and S. S. White crown sticky-wax, 1 per cent.

All of these contraction errors can be controlled by re-heating when investing, if the condition of the wax is not one of internal stress or stretch—in which case the elasticity error, as just shown, may double or triple the expansion error sought, and the ultimate error is very much greater than if the wax pattern were kept cold when investing. The errors or changes due to elasticity of the waxes is never a uniform change, but a true distortion of the mass or part of it. It is probable that every member of the dental profession has experienced a distressing practical example of the contraction change of beeswax when using it for making a bite in order to articulate models when teeth were present in the patient's mouth. He had to either warm it to force it on to the models or carve the wax to let the teeth into it. Even if he warmed it to the temperature which it had when he took the bite, it was often warped.

Up to this point in our procedure, where we have the wax pattern invested, we may have accumulated an error of contraction in the dimension of our cavity pattern, if we invested at room temperature, of from 1 per cent. to 2.3 per cent., according to the inlay wax used; or if we heated when investing, we may have produced an apparent expansion above our starting dimension of from 1.3 per cent. to 2.3 per cent. But, while the volume change takes place regularly with the heating, the expansion does not take place uniformly, owing to the elasticity of the wax, which elasticity is always present when the wax is cooled under a stress. In getting the above expansion of, say, 2.3 per cent., we may in some part of the wax pattern have a linear distortion change, by releasing the elastic stress, of even 6 or 10 per cent. If we have taken an impression with Price's impression wax and cooled and invested or placed the stone model material in it at room temperature, we have a contraction error to carry forward of 0.6 per cent., or if with the S. S. White crown sticky-wax a contraction error of 1 per cent. Neither of these waxes are suitable for heating very much when investing or when placing the model in them. The former has a very small elasticity error, and the latter a large one, if warmed. In hot weather

the temperature of the room is sufficient to release the elastic stress and allow the distortion to take place, though slowly, in all the inlay waxes, especially in the low-melting ones, which, however, have least elasticity.

FACTOR OF ERROR IN THE SETTING OF INVESTMENT MATERIAL.

The next possible source of change in the dimension of our cavity record lies in the setting process of the investment material, but this is not an important factor, as it is small and always represents an expansion. It is as follows—in fractions of 1 per cent.:

Pelton & Crane's inlay investing compound, 0.18; Pelton & Crane and one-half plaster, 0.1; Brophy Imperial, 0.09; Brophy Imperial and one-half plaster, 0.08; Sump, 0.09; Sump and one-half plaster, 0.10; Dendrolite, 0.09; Dendrolite and one-half plaster, 0.05; Fyrite, 0.10; Fyrite and one-half plaster, 0.05; Peck's, 0.07; Peck's and one-half plaster, 0.07; plaster of Paris, stiff mix, 0.13; plaster of Paris, thin mix, 0.10; I. D. L., 0.07; I. D. L. and one-half plaster, 0.8; Taggart's, 0.07; Taggart's and one-half plaster, 0.10.

An error from this source or an opportunity to correct an error from another source is so small as compared with the other errors or changes that we can dismiss the change in the setting of the investment.

FACTOR OF ERROR IN THE EXPANSION OR CONTRACTION OF INVESTMENT MATERIAL ON HEATING.

The next change, however, is very important. It is the expansion or contraction of the investment material when it is heated to burn out the wax, whereby the dimension of the cavity record may be changed considerably according to the procedure employed. In general, all the investing compounds which contain plaster for a binder with silica in excess expand regularly with an increase of temperature up to from 800° to 1000° F., while plaster alone expands only up to 350° F. Above these temperatures these contract rapidly on heating, and all suffer considerable contraction in cooling as compared with either their dimension when heated or before heating. The maximum expansion of the mold from heating, and the subsequent contraction when cold—both in fractions of 1 per cent. for the various investments—is as follows:

Pelton & Crane, maximum expansion 0.71 at 1000° F., contraction on cooling to —0.50; Pelton & Crane and one-half plaster, maximum expansion 0.40 at 350° F., contraction on cooling to 1.10 Brophy Imperial, maximum expansion 0.48 at 900°, contraction on cooling to —1.20; Sump, maximum expansion 0.40 at 310°, contraction on cooling to —1.50; Sump and one-half plaster, maximum expansion 0.35 at 350°, contraction on cooling to 1.40; Dendrolite, maximum expansion 0.35 at 350°, contraction on cooling to —3.50; Dendrolite and one-half plaster, maximum expansion 0.36 at 350°, contraction on cooling to 1.40; Fyrite, maximum expansion 0.38 at 350°, contraction on cooling to —1.20; Fyrite and one-half plaster, maximum expansion 0.34 at 350°, contraction on cooling to —1.50; Peck's, maximum expansion 0.70 at 1000°, contraction on cooling to —0.70; Peck's and one-half plaster, maximum expansion 0.32 at 400°, contraction on cooling to —1.10; plaster of Paris, stiff mix, maximum expansion 0.45 at 350°, contraction on cooling to —1.80; plaster of Paris, thin mix, maximum expansion 0.30 at 300°, contraction on cooling to —2.40; I. D. L., maximum expansion 0.66 at 1000°, contraction on cooling to —0.80; I. D. L. and one-half plaster, maximum expansion 0.35 at 500°, contraction on cooling to —1.50; Taggart's, maximum expansion 0.85 at 1000°, contraction on cooling to —0.60; Taggart's and one-half plaster, maximum expansion 0.34 at 300°, contraction on cooling to —1.10;

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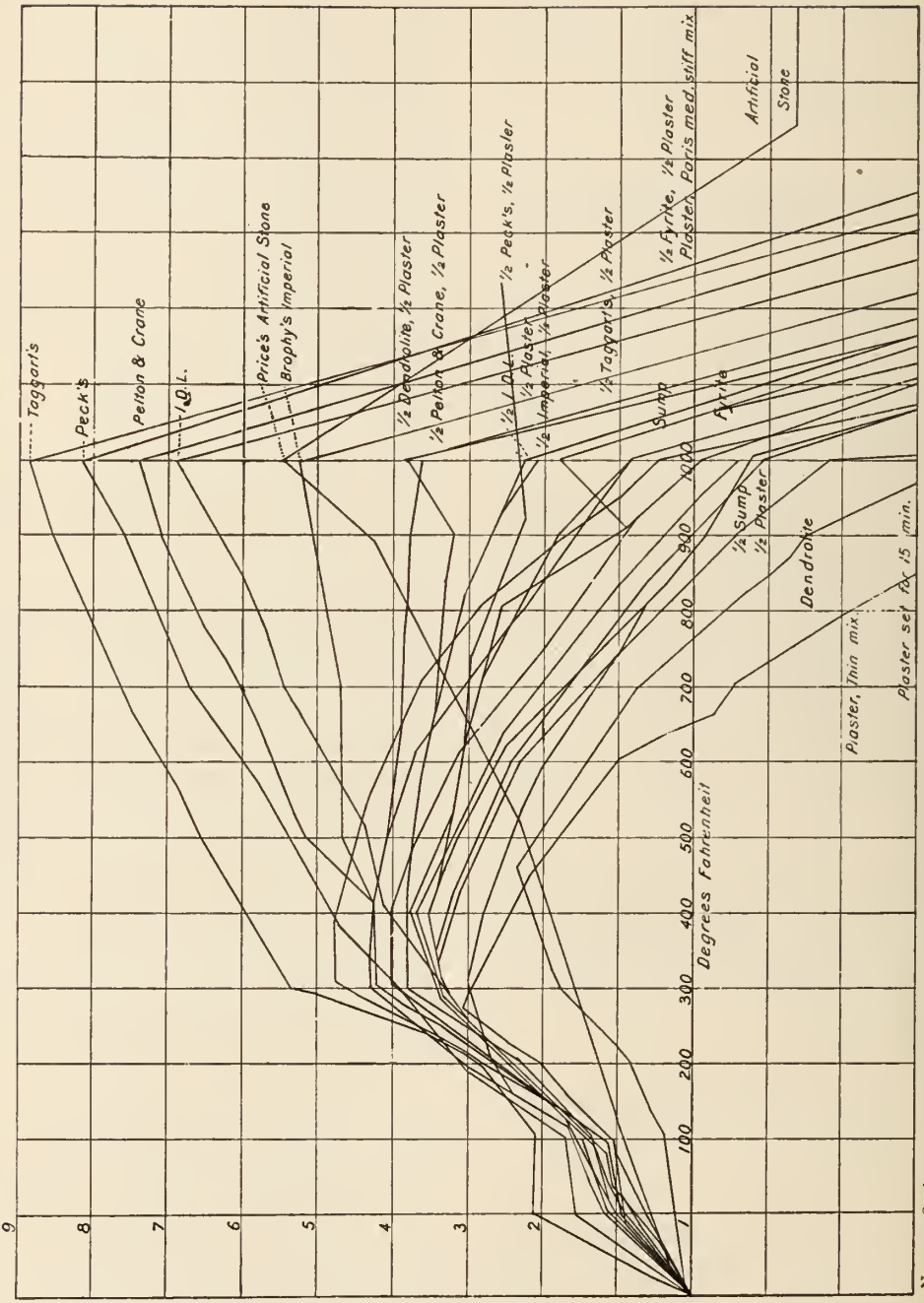
New York

FIG. 5. EXPANSION AND CONTRACTION OF INVESTMENT MATERIALS.

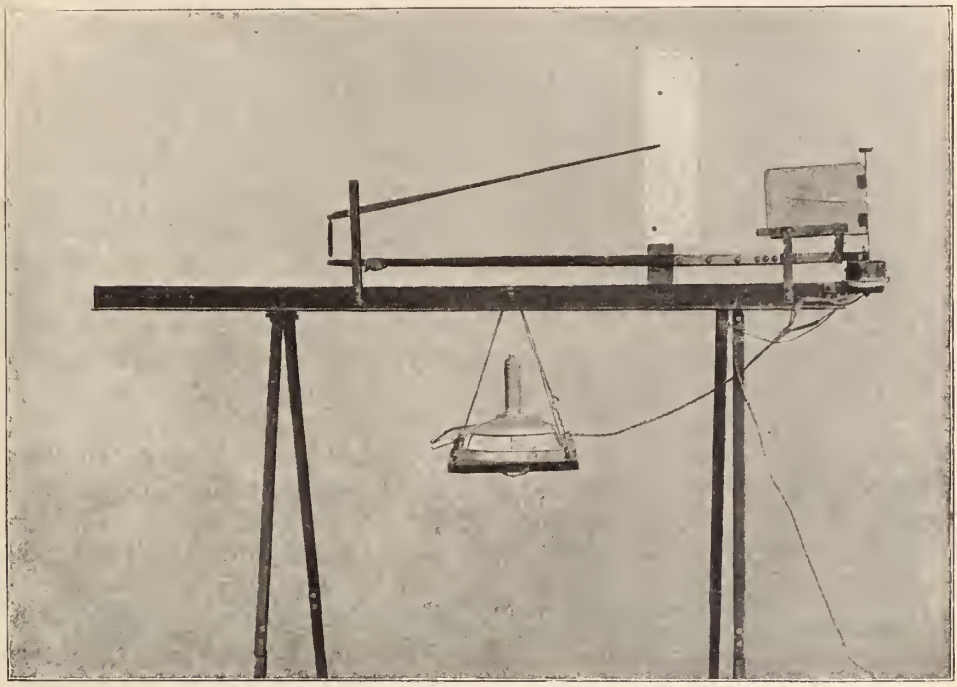


NOTE.—Owing to the size of the original diagram, the lower portion showing the contraction is here omitted. The text, page 113, gives the maximum expansion and the contraction on cooling.

Price's artificial stone for models, maximum expansion 1.20 at 900°, contraction on cooling to —0.02.

The expansion and contraction of all the above compounds at all temperatures up to 1000° F., and again on cooling, is recorded graphically in the chart of curves of temperature in Fig. 5. The base line shows normal dimension, and the expansion in thousandths of an inch is shown in the elevation above that base line. The temperature is shown as normal at the left, and increases in divisions toward the right. The contraction on cooling is shown by the descending curves to the extreme right. This chart shows at a glance the temperature at which the investments should be cast into, to secure the maximum expansion of the mold, and thereby the amount of correction that can be made to offset some of the unavoidable contraction. It also shows the additional error that can be made by letting the investment cool again after heating, before casting into it. These measurements were mostly made in the apparatus shown in Fig. 6, which was made especially for the study of temperature expansions. The piece being studied is heated in a platinum muffle and the temperature recorded by the pyrometer.

Fig. 6.



Author's expansion recorder, with muffle and pyrometer.

In the selection of the temperature of the investment when casting we can control a range from increasing the size of our cavity record by one per cent. or of decreasing it by two per cent. Our total error to and including this step may range—first, from an accumulated

contraction error of 3 or 4 per cent. to a zero dimension without introducing a distortion error from elasticity; second, to an accumulated expansion error of 3 per cent., with elasticity distortion errors.

FACTOR OF ERROR IN THE POSSIBLE CHEMICAL OR PHYSICAL ACTION OF IMPRESSION WAXES UPON THE INVESTMENT MATERIAL.

The next possible error will arise from the chemical or physical action of the impression waxes upon the investment material. This is not a source of much error, and, when it does occur, is a distortion of the mold from flaking of the surface. It usually occurs only when the wax is burned out after the investment has been allowed to dry out. A moist investment when heated will protect the surface from the wax by the steam forcing the wax out of the surface of the mold, instead of melting it into the surface. The error from this source would be a distortion, and not a uniform change in the cavity dimension.

FACTOR OF ERROR IN THE PRESSURE OF THE MOLTEN GOLD UPON THE INVESTMENT.

The next error arises from the pressure of the molten gold upon the investment; this is considerable in amount if the investment is soft owing to either an excess of silica, or poor plaster, or very thin mix, or to heating too soon after mixing and before the plaster has become strong, also to a high pressure. The strength of the investing material when it is entirely cold is much greater than when hot, which gives to readings on cold specimens only a relative and approximal value. Fig. 7 shows graphically the effect of pressure on a cold cubic block, one inch square, of the various investing compounds set under conditions ideal for maximum strength. It indicates chiefly their relative resistance, since the conditions for this test were not those under which we use them practically. The measurements were made with an end comparator made by the Société Geneviève, Switzerland.

The pressure was produced by a smooth flat round surface about one-eighth of an inch across, and 1/91 of a square inch of surface. The curves of Fig. 7 show the distance, in thousandths of an inch, that the plunger penetrated the cold blocks at the various pressures at which some of the blocks collapsed. For example, with the Pelton & Crane cold investment, 16-oz. pressure on a surface 1/91 of a square inch produced an indentation 14/1000 of an inch deep, and at this pressure the cube collapsed. Silica and plaster, four to one, broke at 37 oz., and at that pressure had yielded over 40 thousandths. Taggart's broke at 37 oz., and had only distorted or yielded 5 thousandths. The majority did not crush at 58 oz., and their exact yielding at that pressure is shown on this chart. The artificial stone suggested by the writer did not indent, and was crushed only at a pressure of 16,000 lb. per square inch. Table III shows in detail the amount of indentation into the cold blocks at the pressures indicated.

For demonstrating how easily the investment will fracture when not supported, the following is interesting: A large investment ring is filled even with investment around a small spiral wax core attached to a glass tube with a flange to hold it in the investment, and the wax is burned out in the ordinary way.

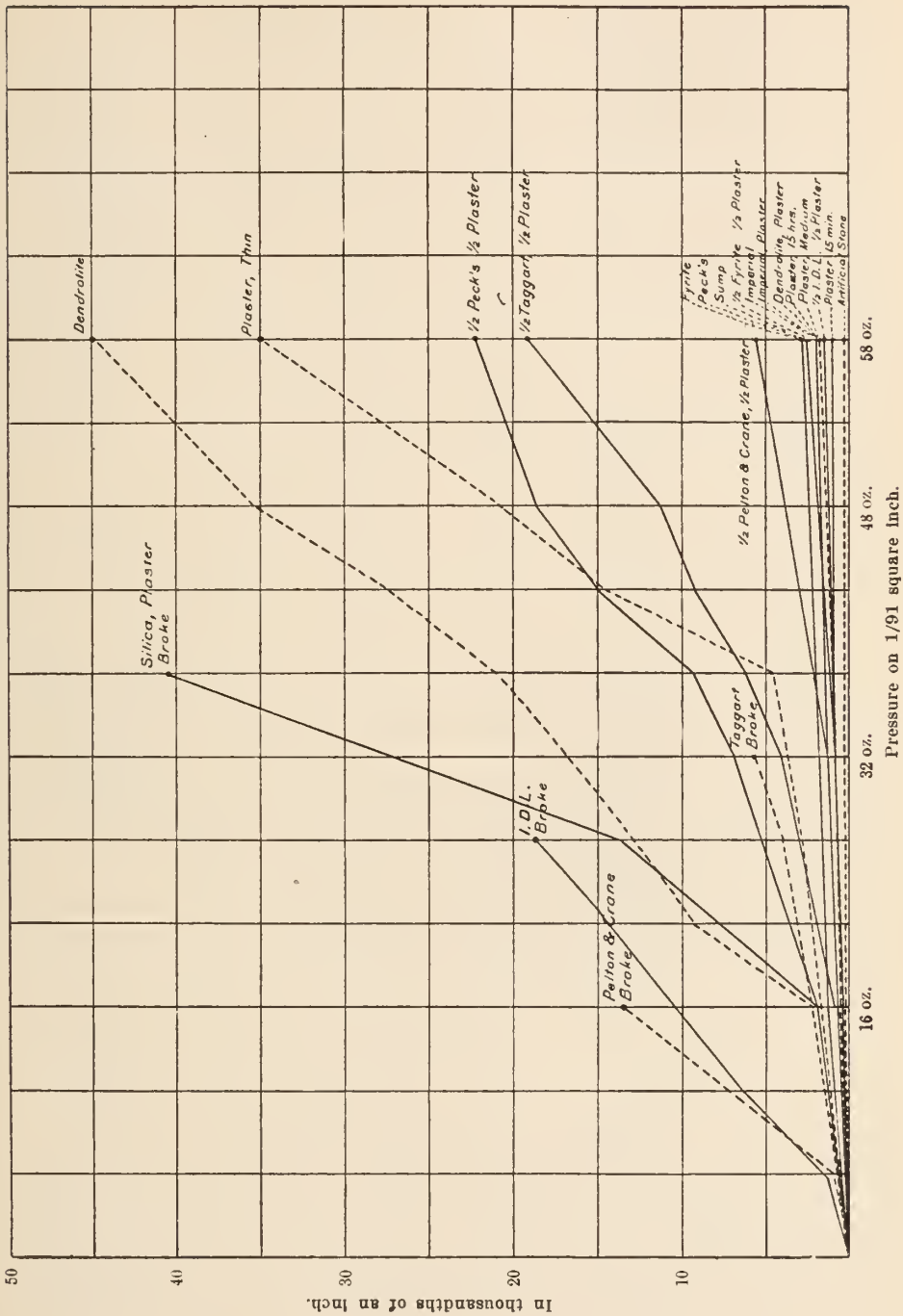


Fig. 7. Yielding of Investment Materials under Steady Pressure.

TABLE III.

YIELDING OF INVESTMENTS UNDER STEADY PRESSURE. ($1.0 = \frac{1}{1000}$ INCH.)

PRESSURE.																						
Lb. per sq. inch.	Oz. on surface 0.127 inch diameter.	Pelton & Crane.	½ P. & C. ½ Plaster.	Imperial.	½ Imperial. ½ Plaster.	Sump.	½ Sump. ½ Plaster.	Dendrolite.	½ Dendrolite. ½ Plaster.	Fyrite.	½ Fyrite. ½ Plaster.	Peck's.	½ Peck's. ½ Plaster.	Plaster, medium.	Plaster, thin.	I. D. L.	½ I. D. L. ½ Plaster.	Taggart's.	½ Taggart's. ½ Plaster.	Plaster, set 15 min.	Plaster, set 15 hrs.	½ Silica. ½ Plaster.
16	oz.																					
0	0.	0.	0.	0.	0.	0.		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0	0.	0.	0.	0.
. . .	5.3	1.0	. . .	. . .	. . .	. . .		0.4	. . .	. . .	. . .	. . .	. . .	. . .	0.2	1.4	. . .	. . .	. . .	. . .	. . .	0.4
. . .	10.7	7.0	. . .	. . .	. . .	. . .		1.2	. . .	. . .	. . .	. . .	. . .	. . .	1.0	6.3	. . .	. . .	. . .	. . .	. . .	1.2
91	16.	13.6	0.6	0.7	0.7	0.4		2.2	0.8	1.2	0.6	0.5	2.0	0.7	1.8	10.5	0.4	. . .	0.8	0.2	0.6	2.0
. . .	21.	Broke	. . .	. . .	. . .	. . .	(No sample.)	9.3	. . .	. . .	. . .	. . .	. . .	. . .	2.4	14.3	. . .	. . .	. . .	. . .	. . .	8.0
. . .	27.	. . .	. . .	. . .	. . .	. . .		12.8	. . .	. . .	. . .	. . .	4.5	. . .	2.8	18.7	. . .	2.0	2.0	. . .	. . .	18.5
182	32.	. . .	1.3	1.2	1.3	1.3		16.6	1.2	1.7	1.3	1.1	6.9	1.1	3.7	Broke	0.7	5.9	4.0	0.5	1.2	28.0
. . .	37.	. . .	. . .	. . .	. . .	. . .		21.3	. . .	. . .	. . .	. . .	9.3	. . .	4.6	. . .	. . .	Broke	6.3	. . .	. . .	40.5
. . .	42.	. . .	. . .	. . .	. . .	. . .		27.5	. . .	. . .	. . .	. . .	15.0	. . .	14.8	. . .	. . .	. . .	9.1	. . .	. . .	Broke
273	48.	. . .	. . .	. . .	. . .	. . .		35.5	. . .	. . .	. . .	. . .	18.8	. . .	20.8	. . .	. . .	. . .	11.4	. . .	. . .	. . .
329	58.	. . .	5.7	2.1	2.0	2.4		45.0	2.0	2.8	2.4	2.5	22.3	1.9	35.0	. . .	1.2	. . .	19.3	1.0	2.0	. . .

Broke—

Pelton & Crane, under less than 21-oz. pressure.
I. D. L., " " " 32 " "
Taggart's, " " " 37 " "
Silica and plaster, " " " 42 " "

Large yielding—

Dendrolite . . . . . 45.
Peck and plaster . . . . . 22.
Thin plaster . . . . . 35.
Taggart and plaster . . . . . 19.

"Artificial Stone."

Under pressure of 58 oz. (= 329 lb. per sq. in.).
Compression of 0.5 ($\frac{5}{10000}$ inch).
True elasticity; no indentation produced.
Specimen broke at 175 lb. = 16,000 lb. per sq. in.

The cavity is filled with mercury till it shows in the glass tube, by applying air pressure through a rubber tube placed over the glass tube. The bursting force from the pressure of the mercury within will be sufficient to force the investment, if there are no ends in the ring, out of the top and bottom of the ring, with even so low a pressure as 20 lb. per square inch. In this case the conditions are not identical or similar to those when air pressure is used in casting, in which case it is applied to the top of the investment as well as to the metal column going within. The coefficient of expansion of all investments when heated is several hundred degrees less than that of the metal rings, which latter consequently cannot support and sustain the investment closely, and this readily allows of a slight fracture and distortion. One means to measure the distortion is to cast simultaneously a bar and a ring attached to the same sprue gate, the wax pattern for which must be made from wax that has been entirely relaxed to remove its elasticity by warming several times nearly to its melting-point before finally carving. The bar of wax is made of a known length, and the ring is made to go over the base of a taper column. In each case the change in dimension for temperature change will be the same, and can be easily determined from the data here given. In fact, all the changes that affect the dimensions will be the same for the two pieces except that the distortion changes of the investment from pressure that will affect the measurements will appear on the ends of the bar and on the inside of the ring. In the former the error will make it appear larger, and in the latter smaller. This is not a uniform change of expansion, but an uneven distortion. The possible or probable errors from this source are so great as to cause a low pressure to be generally used with a soft, weak investment, and make it essential that a hard model or hard investment be used to cast into when a very high pressure is applied. The surface errors due to beads of air or organic matter in the investment should be classed as distortion errors of the surface, and amount generally to a few thousandths at least. Any of these sources of distortion—the compression of the soft investment, the checking and bursting of the mold, enlarging it, or the surface defects of the mold under pressure—may prevent an otherwise very accurate reproduction from going to place or fitting, and will usually be erroneously classed as a uniform expansion, even when they accompany an actual contraction. The first two of these forms of distortion are practically eliminated entirely from all cavity surfaces when casting into a hard stone model or any similar hard mold, and trouble with the latter form is very greatly reduced.

It is impracticable to try to express distortion errors as per cent. increase or decrease in the size of the cavity record, but they usually mean a large increase at some single diameter or surface, making it impossible for an inlay to fit closely to all surfaces within even several thousandths or probably several hundredths of an inch.

ACTION OF THE MOLTEN GOLD ON THE INVESTMENT.

The action of the molten gold on the investment is not a source of large error in the more recent investments which contain a large percentage of silica, but it was so in some of the early compounds which contained fusible ingredients, as soda glass. In their fusing in the sur-

face of the mold or chamber, this was enlarged or distorted.

CONTRACTION OF THE GOLD IN COOLING.

The universally large and fixed error that is a part of all the methods of technique, and the one step around which all others hinge, is the casting of the gold and the contraction continually attending its cooling to normal temperature. This error is divided into the change of dimension attending the change of the physical state from liquid to solid (corresponding, though in a different direction, to the change occurring when ice is formed—having an 11 per cent. greater volume than water) and the contraction from the freezing-point of the gold to normal temperature.

This is the first publication, as far as the writer knows, of any data relating either to the fact of such change of volume with change of state, or its nature and amount. While it is not an exceedingly difficult matter to determine the change in dimension from the frozen or crystallized state down to normal temperature, it has been an exceedingly difficult matter to determine quite accurately the volume change attending that physical change. During the winter of 1907 and 1908 the writer determined the linear contraction change of the gold from its crystallizing or freezing point to normal or room temperature (as published in *Items of Interest,* May 1908), and found it to be 22.5 thousandths, or 2.25 per cent.; but, as stated, these determinations could only be carried to and from the temperature where the gold bars still had considerable strength, and did not include any of the change of dimension with change of state, or the changes occurring close to the crystallizing temperature. Fig. 6 shows the instrument used. Quite continuously since that time the writer has carried on investigations to determine just what occurs when gold crystallizes. One of the methods chiefly used to determine the total contraction of gold after freezing consisted in casting into fused quartz chambers of known dimension, and directly measuring the contraction. This present review of the errors so far encountered in the technique of casting, viz, those of the wax and investments, explains fully the necessity for eliminating all the foregoing technique for a quantitative determination, because the errors introduced would require difficult and uncertain corrections to be made. It becomes necessary to use as a substance for measuring and casting gold into, one with a minimum of expansion and contraction, and the temperature ratio of such change must be a known quantity. Fused quartz has the most favorable qualities of any substance available, since its dimensional change with temperature is about one-fortieth that of gold, and its rate of change is known with accuracy. For this determination it was desired to measure the volume of the gold in the molten state, and again in the cold state, and also at the same time, if possible, to measure the effect of pressure on the location of the contraction as the column was crystallizing, the pressure at any point being equal to the weight of metal above it.

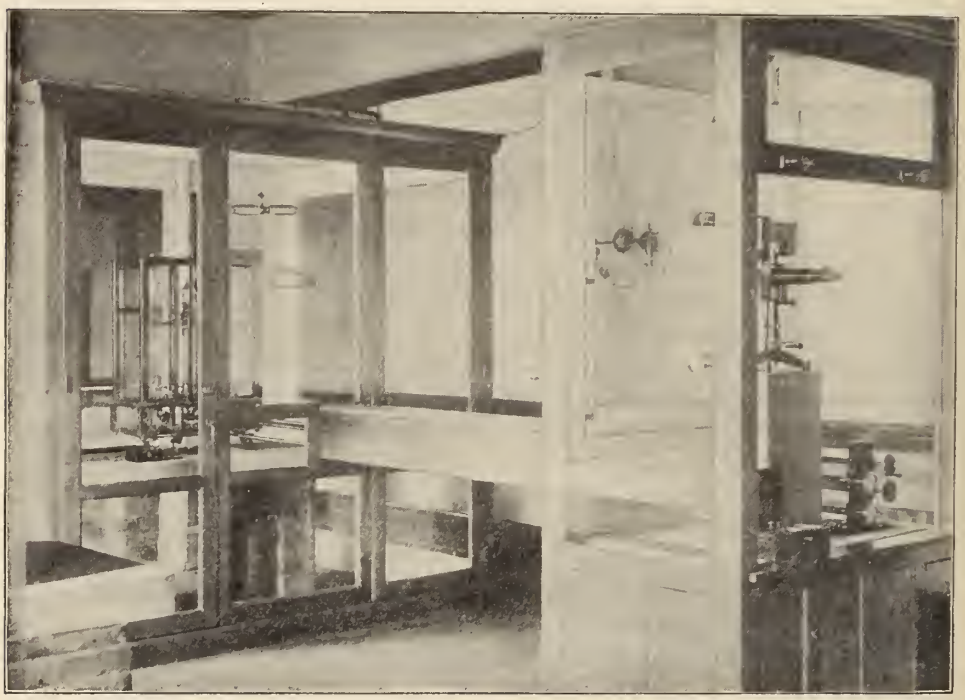
DELICATE TESTS FOR ACCURATELY MEASURING THE CONTRACTION OF GOLD.

Since gold is approximately 19.27 times heavier than water, a column of molten gold a foot and a half high would have a pressure at the bottom equal to

atmospheric pressure, or equal to a column of water 30 feet high. By letting a column of molten gold of known height and diameter crystallize under its own weight, the total reduction in volume would of course be the difference between the volume of the molten column and the same column when cold. The contraction of the cooling column after crystallizing being measurable, the difference would be the change due to the change of state. The effect of pressure on the cooling mass would be exactly indicated by the relative reduction in the cross section at any point, as the mass cooled under its own weight, if the molten column had parallel sides of known distance apart. To accomplish this determination, the writer had made of fused quartz a chamber, 25 cm. (10 in.) high, and 1 cm. wide and 2 mm. across. This chamber was made by placing four pieces of fused quartz together, two narrow pieces, 3 cm. wide, being placed 1 cm. apart, between two pieces 7 cm. wide. The two inner edges of the two narrow pieces were ground very straight from end to end, approximately to within one ten-thousandth of an inch, in order to measure accurately the exact reduction in cross section of the gold column at all distances from the top of the column, or at all pressures up to the maximum. The lower end of the chamber was closed and the upper surfaces were ground flat and smooth in order to place a flat cap over the chamber to produce a column of molten gold that precisely filled the chamber. A special very large electric muffle was constructed to receive and heat the quartz vessel. It was necessary to have the quartz blocks made in Germany—which, together with the labor expended in making the two straight edges so accurate, made the instrument very expensive. Since fused quartz has a lower expansion and contraction change with temperature than any substance that could be found to hold it together, it became impossible to hold the quartz pieces together at the high temperature of molten gold under the enormous pressure of the full ten-inch column of molten gold, which was equivalent to a column of water twenty feet high. A four-inch column was the highest that could be sustained, which gave us measurable cross sections up to that pressure to determine the effect of pressure on the location of the contraction. The chamber of fused quartz was then made in the form of a continuous tube with the lower end closed and the upper end ground flat as before. This permitted only of the determination of the entire change of volume from liquid to normal temperature, without the possibility of measuring at the same time the effect of pressure on the location of the contraction. A special platinum wire resistance muffle furnace was again made to heat this one-piece quartz chamber filled with gold. A pyrometer thermo-electric couple was placed at the base of the chamber to record its temperature. When the chamber was slightly more than full of molten gold the ground-flat cover made of artificial stone and heated was placed over the chamber and pressed down, thus crowding off the excess as the temperature was held at just the melting-point by means of the pyrometer and rheostat. This was repeated five times, and the gold was weighed with great exactness as will be explained. This determination of the volume change of the gold is based on measuring the difference in the volume change of the fused quartz and the gold, and thus determining the volume change of the gold, that of

the fused quartz being known. Fortunately, this latter change has been determined very accurately by Mr. Howard Minchian of the department of physics of the University of Michigan, to within an error of one part in 1,500,000, by the following method: A beam of monochromic light was passed through a fused quartz piece supported on a fused quartz cylinder to be measured, in such a way as to produce interference rings, and, as the cylinder expanded on being heated, the rings moved outward with each additional wave-length of distance between the reflecting surfaces. In other words, the divisions of the ruler used for measuring were the waves of light themselves. Mr. Minchian found the coefficient of linear expansion (the rate of expansion per degree) of fused quartz constant up to 950° C. and to be $44.9 \times 10^{-8} = 0.000000449$. Cubical or volume expansion is approximately three times linear expansion. The volume of the fused quartz chamber was determined by weighing the mercury which it contained, and making corrections for temperature and buoyancy of the air, etc., and measuring the specific weight of the mercury used. Three calibrations gave the volume of the fused quartz chamber at 0° C. to be 3.679 cubic centimeters, and, at the melting-point of gold, 1064° C., this amount plus the cubical or volume expansion of the fused quartz cylinder to that temperature, which, using Minchian's values for the quartz expansion is $[(1 + 3 \times 0.000000449) \times 1064] = 3.686$ ccm.

Fig. 8.

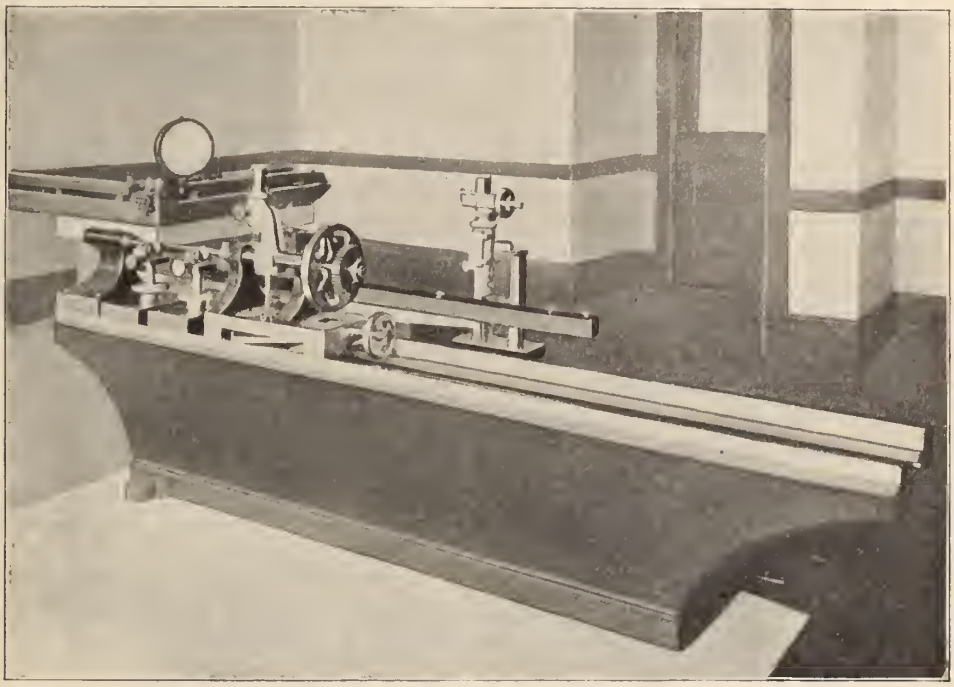


Large precision balance. General view, showing operation from a distance.

To reduce the weight of the cold gold which filled the chamber when molten, to volume, its specific weight was accurately determined by weighing in water in the balance shown in Fig. 2, and found to be 19.267 at 0° C. The weight of the cold gold which filled the chamber when molten was determined by five tests, and found to be 63.670 grains, which reduced to cubic centimeters is 63.670 ÷ 19.267 = 3.305.

The weighing of the gold and the mercury required to be done with very great accuracy, and it was done with the instrument shown in Fig. 8, which is credited with being the most sensitive weighing instrument on the continent. It will register, for example, the difference in the weight of a kilogram weight when lifted two inches farther from the earth. It is a part of the splendid equipment in physics at the Case School of Applied Science. The weighing is done at a distance of twelve feet from the balance and in a separate cabinet, the weights being operated by a mechanism extending into the double case surrounding the balance. The readings are made with a telescope. It takes about two hours to make a single weighing, which can be done to within one thirteen-thousandth part of a grain on a full load of two and one-half pounds.

Fig. 9.



Precision end comparator, used in measuring length of gold bar.

The volume of the gold at 0° C. was 3.305 ccm., and when molten at 1064° C., 3.686 ccm., hence its total contraction between these temperatures is 0.381 ccm. The contraction per cubic centi-

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New York

meter is 0.381 ÷ 3.305 = 0.1153, or, expressed in per cent., the volume change or total contraction is 11.53, which is probably much larger than any of us suspected. Since linear change is one-third the volume or cubical change, the total linear contraction of gold is 3.84 per cent. from the molten state to 0° C.

To find the part of this change that is due to change of state we must subtract that part which takes place after the gold has crystallized.

The writer had previously determined this to be, as noted, 2.25 per cent. linear or 6.75 per cent. volume. To verify or correct these measurements they were repeated with great care to eliminate all possible sources of error such as radiation. Two bars of the same gold were made of different length, one 12.619 cm. or about five inches long, and one-quarter of an inch in diameter, and the other 16.201 cm. or seven inches long and one-quarter of an inch in diameter. A special platinum wire resistance muffle was made for each, closely fitting to the gold, and with a thermo-electric couple attached to the bar in the center of the muffle, and insulated from the gold as it passed out. The square ends of the bar were covered with measured mica plates to reduce radiation at that point. The bar was heated slowly, and measurements were made on the ends, at every 50° C. up to the sagging point. These measurements were made very accurately in an end comparator measuring to 1/100,000 in. The instrument is shown in Fig. 9. But there was some radiation at the ends of the bar, which error must be eliminated. Since any two similar bars have the same error from radiation at the exposed ends, a section in the center of the longer bar, left after subtracting the shorter bar, will represent the true expansion, since all errors from radiation have been removed by subtracting the shorter bar. Hence the two-inch section in the center of the seven-inch bar left after subtracting the five-inch bar will be free from radiation errors. These measurements are shown graphically for both bars in Fig. 10. The base line represents temperature, and the elevation shows expansion in hundredths of a centimeter. Since the gold has not strength within fifty degrees of its melting-point, that part of the curve had to be computed, and is shown extended in the dotted line in Fig. 11. In this chart is given the expansion of a bar, 1 cm. long, in thousandths of a centimeter. The base line represents temperature, and the elevation expansion. The lower curve is the expansion of a 1-cm. piece from the longer or seven-inch (16 cm.) bar, without correcting for end radiation, the upper the expansion of the same piece after eliminating end radiation, and the dotted part the extension for the part of the range too near the melting-point for the gold to have strength enough to measure, so is computed. In this chart the curve of expansion for the fused quartz is also shown up to the same temperature, viz, the melting-point of the gold, and, as seen, it is very small in comparison.

These more exact measurements of the expansion of pure gold up to its melting-point change the second decimal of the original determinations, making it 2.20 per cent. linear instead of 2.25 per cent., and 6.60 per cent. volume instead of 6.75 per cent. This contraction of the gold after crystallizing or freezing, subtracted from the total contraction, gives the contraction that takes place with the change of its physical state—viz, expressed as volume or cubical

FIG. 10. OBSERVED EXPANSION OF GOLD BARS.

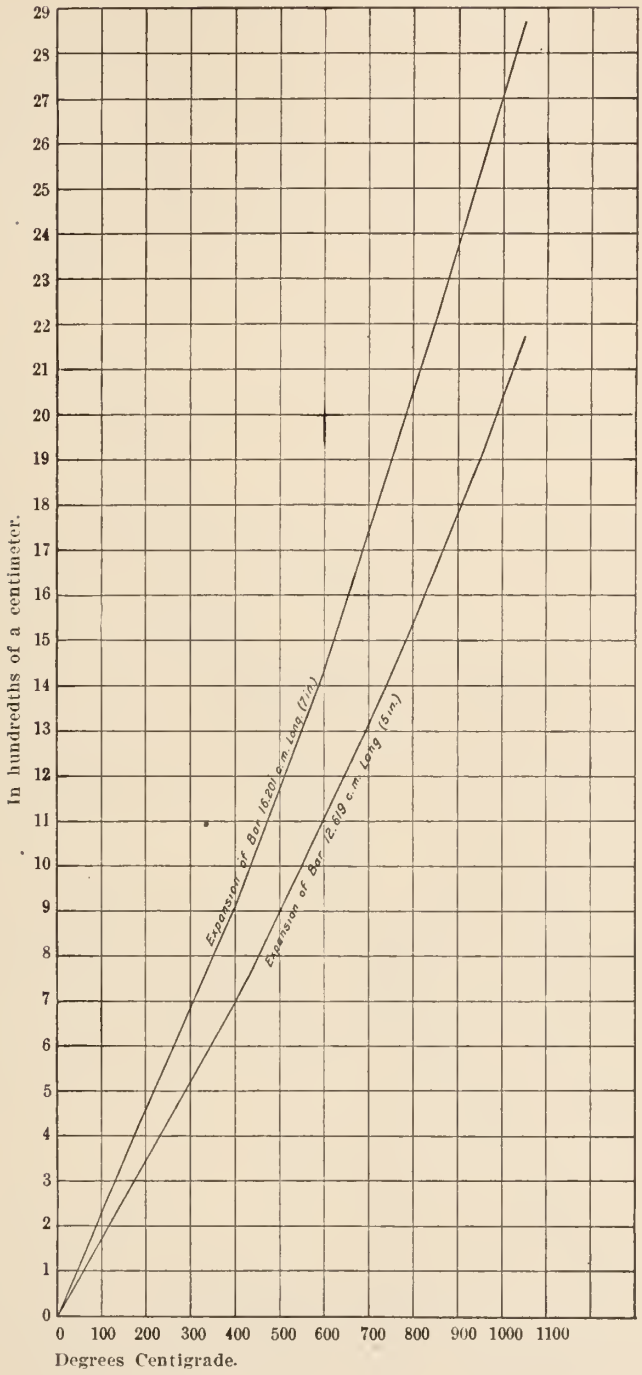
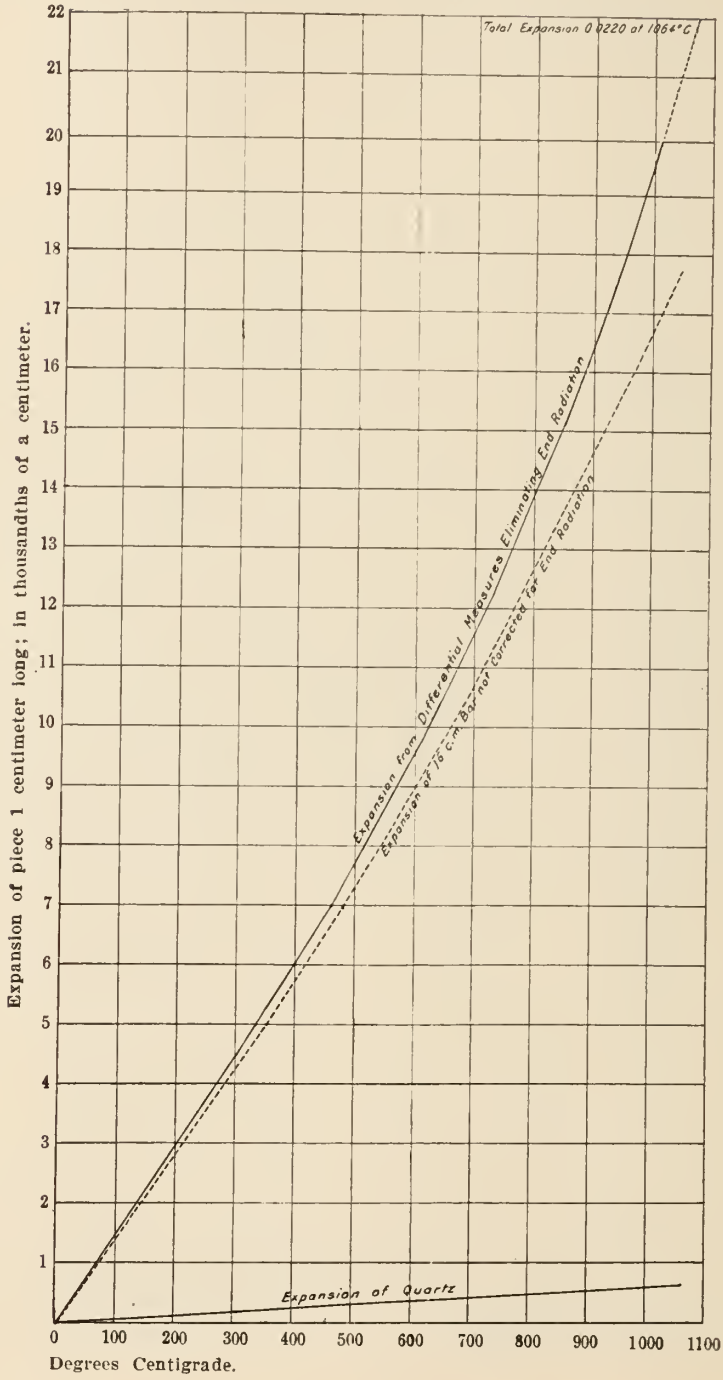
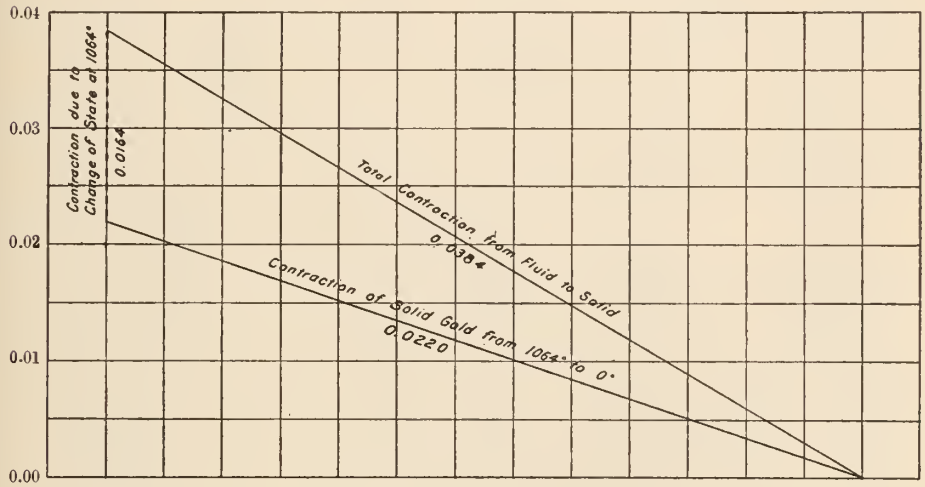


FIG. 11. LINEAR EXPANSION OF PURE GOLD, AND EXPANSION OF QUARTZ.



change, 11.53 — 6.60 = 4.93 per cent., due to change of state or latent heat of fusion; or, expressed as linear contraction, 3.84 — 2.20 = 1.64 per cent., or linear contraction due to change of state without change of temperature. Fig. 12 shows graphically the proportion of the contraction changes. It may be assumed that, wherever and whenever pure gold is melted and cooled, these changes in dimension take place, and this becomes one of the most rigidly fixed factors to which we must adapt our technique. In other words, we must systematically produce a definite error elsewhere to neutralize or correct that part of this error that cannot be controlled.

Fig. 12. Total Contraction of Gold.



CONTROL OF THE LOCATION OF THE CONTRACTION OF GOLD.

Probably no dentist who has done casting has failed to see that frequently there was a hole or depression in the side of the casting, or even a complete separation between the sprue and inlay. This is the result or expression of the contraction due to change of state; it is, however, an error that we can control entirely. While we cannot prevent contraction due to change of state, we can control its location. In other words, we can, by forcing in molten gold from the sprue to take the place of the accumulated contraction in the inlay, cause all the contraction due to change of state to appear in the sprue. This can only be done by having the gold in the sprue molten when that in the inlay is crystallized, which can best be secured by having the mass of gold in the sprue large in proportion to the inlay, and by using a high enough pressure to move the gold in; also by using a relatively large gate, and having the investment sufficiently heated so that the gold will not be quickly chilled in the gate. With a high pressure not only can this part of the contraction—*i.e.* that due to the change of state from liquid to solid, and amounting to 4.9 per cent. of volume and 1.64 per cent. of linear dimension—be entirely

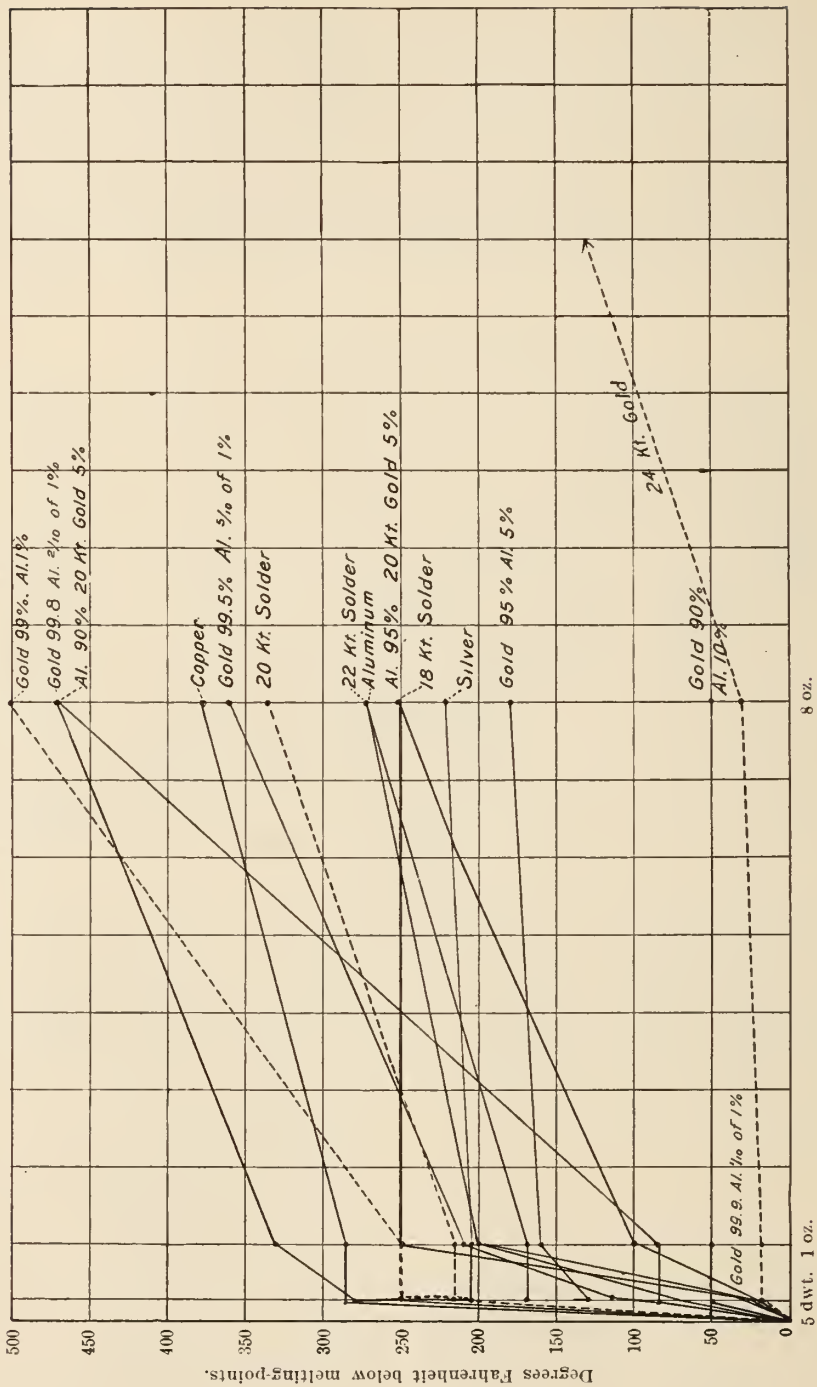


Fig. 13. Pressure Movement of Gold and Alloys After Crystallizing.

controlled, but, if conditions are made favorable as by the above suggestions, even a little more of the contraction than the above can be controlled by pressure, for as long as the pressure on the column of gold is greater than the strength of the gold, the latter will move. Fig. 13 is a chart showing graphically the effect of pressure on gold and its alloys after they have passed through the change of state and are crystallizing and cooling toward zero.

CONTROLLING THE GOLD BY ADDING ALUMINUM.

Eight ounces of positive pressure, on a square surface one-eighth of an inch square, moves pure gold, as shown by this chart of curves of pressure effects, only 30° F. below its melting-point, and if 0.2 per cent. of aluminum be added to it, the strength of the crystal is so reduced that it will move 470° F. below its melting- or freezing-point. Pressure of 24 oz. on the same surface will move pure gold 200° F. below its melting-point. It will be obvious that these pressures could only be used in practical work when casting into or against a very strong material, if it is to retain the cavity surfaces without distortion. Through the range of cooling temperature below the point where the pressure used will move the congealing mass, the normal contraction will take place, and with pure gold and with the pressure that could be safely used with ordinary investments we cannot expect to do much more than control the contraction due to change of state, though with a hard, strong investment, as when casting into a stone model, we can control a little more. This leaves in general 2.2 per cent. as a fixed contraction error that cannot be prevented in an ordinary technique, and this error must be corrected for by introducing systematically an expansion error elsewhere sufficient to take care of it, or we must mechanically prepare our cavity with a bevel everywhere and depend upon burnishing a pliable metal tightly to that margin. This latter method, however, only provides a correction for the difficulties arising from the shortening or drawing away of the gold from a margin of an inside dimension; it does not relieve those difficulties arising from the shortening of an outside dimension, as when the metal goes over any outside surface, like a double compound cavity or a crown base—where, instead of the contraction drawing the metal away from a margin or surface, it draws it toward it.

CONTROLLING THE GOLD BY CASTING INTO A MODEL OF ARTIFICIAL STONE.

Fortunately we have a means for correcting a large part of this most troublesome class of error—viz, by holding the contracting gold so rigidly that it is compelled to stretch. This is accomplished by making the mold into which we cast of a material so strong that the cooling gold cannot crush it, but will itself be stretched. The practical material for casting into, that has strength enough for this, is a hard model made of a special silicate cement, viz, the artificial stone suggested by the writer, which is made synthetically by fusing together

Pure silica,	20 parts
Calcium hydrate,	19 "
Aluminum oxid,	42 "

at a temperature of about 2750° F. This is powdered free from iron and added to equal parts of a very highly vitrified potshell, and after thorough mixing and

grinding together forms a very hard model when mixed with phosphoric acid. The model becomes hard only after being heated with dry heat. Great care is required to have the materials so balanced chemically as to produce a model with zero contraction on setting. It can also be made by fusing together

Kaolin,	3 parts by weight
Calcium hydrate,	1 part " "
Aluminum oxid,	1 " " "

and treating as above.

When inlays for double compound cavities are cast of pure gold on such a model, the gold will be stretched and held. Incidentally this model method has many advantages, as described in detail in *Items of Interest,* September 1909.

CONTROLLING THE GOLD BY CASTING OVER THREADED IRIDIO-PLATINUM BARS.

Another method for holding the gold from contracting, or of causing it to stretch when contracting, is to cast it over iridio-platinum bars that have been threaded. This will control a large part of it, if the proportion of iridio-platinum to pure gold is large, otherwise the bar itself will be contracted. If the bar is not in the center of the mass, the whole will be warped by the uneven contraction. These bars answer a double purpose in inlays by giving a greatly increased strength just where most needed. They should be used in double compound cavities when united through a shallow or narrow step in the occlusal surface, and in the occlusal step of approximal cavities. This method of preventing the normal contraction of the gold by iridio-platinum bars will not, however, correct more than one-half of the normal contraction, depending upon the relation of the masses of each, iridio-platinum bar and pure gold, and the shape of the casting. We can count ordinarily upon one-half of 1 per cent. correction from this source in the occlusal step of single or double compound cavities.

The relatively exact changes of dimensions that we have been reviewing as accompanying the technique chiefly of the Taggart direct method are all common to most inlay methods to a greater or less extent, and the one process which is common to all and is the foundation of them all, viz, the melting and cooling of gold, obeys the same laws in all methods. This is the one fixed condition to which all our technique must be adjusted, and it may be briefly stated as follows: Gold when molten occupies approximately one-ninth more space than when at normal temperature, and just after changing its state, or freezing, occupies approximately one-fifteenth more space than at normal temperature.

The gold can be moved, when changing its state, by pressure, which enables us to determine or control the location of the displacement due to change of state. The location of the remaining part of the change of dimension or contraction can only be controlled in small part by pressure, unless a very high pressure be used and unless a small per cent. of aluminum be added to the gold to change its law of crystallization.*

The contraction after crystallization, of 2.2 per cent. linear or 6.6 per cent. volume can only be corrected by compensation—that is, by uniformly enlarging the mold which is to receive it.

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* The writer, before differentiating between the contraction due to change of state and that due to the contracting solid gold, read pressure control as all being over the contracting solid gold.

RÉSUMÉ OF DIMENSION CHANGES AS PRODUCED BY EACH STEP IN OUR CASTING TECHNIQUE.

If we now follow through our technique and sum up the dimension changes that can be produced by each step to reduce or add to this fixed contraction, we find—assuming that the contraction due to change of state is controlled by pressure—the following:

First step. In removing the pattern from the cavity we chill it, and thus reduce its volume from 1.8 to 10 per cent., which is a linear contraction of 0.6 to 2.3 per cent. (see Table II), the volume or cubical contraction being three times the linear, making our contraction error, together with that of the gold of 2.2 per cent., total 2.8 to 4 per cent. This provides that the pattern be invested at its reduced temperature, at about 67° F.

Second step. If the wax pattern be warmed when invested, to the temperature at which it was when placed in the cavity, this total contraction error can be reduced to that of the gold, of 2.2 per cent., and if heated to a higher temperature than when it was placed in the cavity we may get an expansion of the pattern above its original size of from 1.3 to 2.4 per cent., or apparently enough to correct the fixed error of the gold. But we have no wax that has so little elasticity as to keep its form when warmed even to the original temperature at which it was placed in the cavity, let alone permitting a higher one; for by heating a molded or stretched pattern of any of the waxes on the market known to the writer we may introduce distortion errors several times worse than the error to be corrected. (See Table II and Fig. 4.) We are compelled for safety, then, until we get a better wax, to invest at the lowest temperature and proceed with an accumulated error of 2.8 to 4.6 per cent. (the contraction of both the wax and the gold), according to the pattern wax used.

Fourth step. We may ignore the change in dimension of the investment in the process of setting, and pass to that due to heating and cooling the investment.

Fifth step. (See Fig. 5.) This step of heating the investment will give us a choice, according to the technique employed, of an expansion of about 1 per cent. or anything less, to a contraction of 2 per cent., if, after heating a thin mix with an excess of plaster, we let it cool off and become cold before casting. If we cast at the best temperature for maximum expansion (see Fig. 5) our total error will at this point represent a contraction of from 0.8 to 3.6 or even to 6.6, if the investment used has contracted instead of expanding.

We will pass the *sixth step,* viz, the effect of the wax on the investing material, as it is not an important source of error.

Seventh step. The pressure of the gold in the investment material will always produce a serious distortion error if the investment material is very weak and the pressure high. It will appear in the form of distortions, and not as uniform expansion. It is overcome entirely on the cavity surfaces of the inlay by casting into a hard model in the investment.

Eighth step. The action of the gold on the investment we can pass, as being but slight.

Ninth step. The change of dimension due to change of state will be corrected for by pressure; it would not appear as

a uniform contraction, but as a fault in the side of the inlay.

Tenth step. The contraction of the solidified gold has already been included as a fixed contraction of 2.2 per cent.

Eleventh step. The distortion of the mold of the cooling gold includes all conditions under which the gold surrounds some investment which is not strong enough to hold its shape as the gold contracts, permitting distortions such as the crushing of the core in a crown base or between the mesial and distal pulpal walls of a double compound inlay. In result, this error is the contraction of the solid gold. Its correction comes in the next step.

Twelfth step. The holding of the gold, causing it to stretch, is done over a hard model or over iridio-platinum bars in its mass, which will permit us to control nearly all of the error due to shortening of the outside dimension of the mass of the gold, if it is not too large in proportion to the mass of the artificial stone or other hard model inside it. But this will only apply to the gold surrounding a core, as the mesio-distal diameter of the mass of gold between a mesial and distal filling in a double compound cavity where these cavities are united across the occlusal surface, or where the gold surrounds a mass, as a crown base or a ring. The writer has a taper column of brass on which very many rings of wax have been made and cast in gold by different operators and methods, and the only rings the writer has ever seen that were actually as large as the mandrel on which they were formed were those cast over artificial stone; and by using a grade of stone that expands on setting they would pass over the base of the mandrel or taper column easily.

We have, then, as the best results available by the present materials and present technique a final contraction error for inside dimensions of, at best, 0.8 per cent., and from this up to 3 or even 6 per cent., according to the materials and technique used—which will prevent a gold restoration from going to place over an outside dimension. In such a condition, if the gold can be held it can be stretched, thus correcting this most serious error. The surface errors and the distortion errors may be enormous; they may be mistaken for expansion, and are generally sufficient to prevent an otherwise perfect reproduction, if we had it, from going to place; hence the making of a joint within 1/1000 in. close at every point around cavities by casting a perfect inlay is at present impossible. The uncontrollable contraction of the gold also makes this an impossibility as yet.

FINAL CONTROL IN THE BEVELING OF THE CAVITY MARGINS AND BURNISHING OF THE INLAY.

Hence we must use a mechanical means for closing within 1/10,000 inch every part of the margin of an inlay, and this the writer believes can be accomplished with even all our at present uncontrolled errors, involved in even the best technique, by preparing all cavities with bevel margins and providing a chisel-shaped margin of gold to cover every border of every cavity, which margins must be of a pliable metal to be burnished and finished to the tooth while the cement is soft. This means only pure gold for margins, and added strength should be gotten wherever required by casing in it iridio-platinum, preferably in the form of threaded bars.

ESTABLISHMENT OF RESEARCH LABORATORIES ADVOCATED.

The art of casting will be greatly benefited by the perfecting of pattern and impression waxes free from elasticity error but with good expansion and wide working range, and by an investing medium that will expand on heating 2 or 3 per cent. linear, and also be hard and strong to permit of high pressures.

The profession should establish research laboratories equipped and maintained for continually following up and perfecting these fundamental requirements for our professional services, as the rapid march of dental progress is constantly presenting new problems and methods that are based upon materials and principles that have not been studied in connection with the other and older sciences.

It is not the writer's privilege to say what the amount of error is in the technique of his fellow practitioners, but he knows both from the technique used and the results shown that it is often very large indeed, and that very few in the profession are regularly producing gold inlays that do not show at some point a trace of a cement line, which high ideal in the majority of cavities it is today possible to attain. This fact, viz, our imperfect results, and the ignorance regarding the principles and physical properties of the materials involved, which ignorance causes these imperfect results, have induced the writer to make this exhaustive study. He believes that the demand of the profession of tomorrow will be that every dentist assuming to render the best service must make himself familiar with the physical properties and the laws governing the behavior of the materials which determine the perfection of his service. In other words, he must know the fixed conditions, and adapt himself and the variable conditions to those fixed conditions, to produce the highest possible perfection. For example, if any dentist will take the inlay or impression wax that he uses and turn to Figs. 1, 2, and 3, and Table II, and study faithfully the behavior of that particular wax, and note how he shall use it to produce the least amount of errors, and then turn to the investments shown graphically in Fig. 5, and note at what temperature the investment which he uses should be cast in order to produce the maximum expansion, he will probably, in a few minutes, see at which step he can reduce his present casting errors several fold.

Discussion.

Dr. T. P. Hinman, Atlanta, Ga. This paper certainly commends itself to us most strongly. So many of us in the past have been doing work empirically. In this paper we are given a scientific consideration of this subject which will enable us to determine the conditions present with such exactitude that we can be assured of accurate results. We cannot know exactly how much time and money the preparation of this paper has cost Dr. Price, and I want to thank him very sincerely for this work. He has opened up a road of investigation that we in some small way should follow. He is the only man I know of who really is willing to devote so much time to the advancement of the profession in this particular field.

The contraction of gold in inlays has annoyed us to a very great extent. The essayist has shown us what has been the real trouble, and I am sure that everyone who has heard this paper cannot help

but be greatly benefited by it, for we can understand more thoroughly just what conditions are present in the different stages of casting, and what changes take place in our material from the molten state to the point of crystallization.

We learn from this paper that the molten gold as it goes into the mold is about four per cent. larger than it is when it has chilled and contracted. The essayist has demonstrated the very interesting fact that if we were to add 0.1 or 0.2 of 1 per cent. of aluminum to the gold, we can, if we continue the pressure on the molten gold, or after it has left the molten state and to a point within 450° of the temperature at which it solidifies, actually force more gold into the mold.

He has also shown that all of the soft materials that are readily mixed for the purpose of investment are absolutely inadequate to hold the gold under that pressure.

I have made a number of experiments with "artificial stone," and you will find that by using artificial stone you can create enough pressure to hold the material in position until not only crystallization, but hardening takes place. This is particularly true in what is known as a compound cavity, such as mesio-occluso-distal cavities in bicuspids and molars.

In the making of cast fillings, I have come to the conclusion that it is not safe to make large cast compound fillings out of pure gold. If this is done, especially in bicuspids, the stress of mastication will batter down the gold, and cause one or both of the walls to break off.

The trouble has been that if we add aluminum to the gold in order to make it harder, the material is not pliable enough to enable us to burnish it to the margins to protect our cavity walls. Dr. Price has suggested that we first cast a layer of pure gold, and then over that a layer of gold and platinum, which is a most excellent idea.

I wish to thank Dr. Price personally for the great service he has rendered me in clearing up a great many matters that were very obscure.

The section then adjourned until Thursday morning at 10.30 o'clock.

THURSDAY—Second Session.

The section was called to order by the chairman, Dr. George H. Wilson, at 10.30 A.M., on Thursday, July 21st.

As the first order of business,

Dr. V. H. Jackson, New York, N. Y., was then introduced and read a paper entitled "Orthodontia and Orthopedia of the Face, and the Influence of Expansion of the Dental Arches in Establishing Normal Respiration," as follows:

Orthodontia and Orthopedia of the Face, and the Influence of Expansion of the Dental Arches in Establishing Normal Respiration.

By VICTOR HUGO JACKSON.

In 1887, 1900, 1907, and 1909, the writer called attention to the importance of expanding the dental arches for the purpose of increasing the lumen of the nares to improve breathing. From 1887 to the present time, he has continued to note the results of treatment in the many cases that have come under his observation.

EXPANSION OF THE UPPER DENTAL ARCH.

Before discussing this subject, it seems advisable to first consider the general plan followed in expanding the upper dental arch.

When the teeth are irregular, they are usually very much crowded in the arch. This is most generally evidenced by there being insufficient space between the canines for the proper arrangement of the four incisors.

In expanding the arch laterally, the anchorage should always include the canines with the bicuspids and molars, as, when expansion of the arch is required, generally more space is needed between the canines for the correction of malposed incisors. The necessity of moving the canines outward with the bicuspids and molars is made the more apparent by considering the lines of force.

Of the many cases requiring lateral expansion of the dental arch to improve the occlusion of the teeth, not more than from fifteen to twenty per cent. require expansion of the distal part of the arch.

In making a regulating appliance, where only the anterior part of the upper arch needs lateral expansion, a base wire, No. 10 or 9 U. S. standard wire gage, known as the palato-distal base wire, is arranged to cross the distal part of the arch where it is broad enough.* The palato-distal base wire is always shaped to follow the palatal curve of the arch, with the ends bent forward, forming arms to rest on partial clasps arranged on the lingual side of the molars, bicuspids, and canines. The ends of the arms are tapered to make them less bulky. The arms are the foundation of the anchorage portions of an appliance; they are soldered to the partial clasps with the ends of spring clasps and finger springs.

ANALOGY OF APPLIANCES USED WITH THE HUMAN BODY.

To impress upon the mind the many features of the appliances to be presented, I might here point out the analogy and compare with the human body the removable regulating appliances as described in this paper.

The base wire is the foundation or

* Jackson, "Orthodontia," 1904. ("Expansion of the Dental Arch.")

body of a regulating appliance; it is made of large spring wire. The portion of the base wire connecting the lateral divisions of an appliance is always large and strong; the ends are bent to project forward or backward, like arms. The arms are shaped to rest on partial clasps on the lingual side of the anchorage teeth.

The base wire is like the human body with the arms extending forward from the shoulders, which are represented by the arms of the base wire extending forward. There are fingers on the ends of our arms, and likewise there are metal fingers attached to the ends of the metal arms of an appliance.

The essentials of a regulating appliance are a strong body, strong arms, and strong fingers, as each have to do definite work. They should be large and strong enough to move the teeth a definite distance in a given time, and not move the teeth farther than is intended. If a man is not strong enough to accomplish the work laid out for him, a stronger man is employed. We would deal with this matter in the same way; in making a regulating appliance, always having it built strong enough to cause the arms and fingers to act definitely in making the desired movement of the teeth and process.

Again, the human body performs all movement by muscular action; this, in effect, is similar to the action of a metal spring. The human fingers and arms grasp objects and move them definite distances with ease, following the command of the will. The plan of this system of regulating is to have an appliance built sufficiently strong and so thoroughly anchored as to move the teeth a definite distance in the desired direction in a limited time.

The analogy mentioned will be apparent in the study of all the appliances presented, making some of the details in their description more readily understood.

In designing an apparatus for moving the teeth, one would generally be led to adopt correct forms of metal arms and fingers by first shaping his finger as he would to move a similar object.

ORTHODONTIA AS AN EXACT SCIENCE.

Orthodontia and orthopedia of the face have been recognized as a science, but it is desirable that the different phases of orthodontia be reduced to an "exact science"—that the mechanics be so simplified that any operator of steady judgment can perform at least ordinary operations without overtaxing his mechanical skill.

It is understood that the teeth can be successfully regulated by any method employed in practice, but less time should be required in making and adjusting appliances, in the attendance of cases, and the regulating should be completed by a smaller number of visits, and no pain or special discomfort should be caused to the patients.

RECORD CARD.

To accomplish this, several years ago the author devised a method* of making a careful pencil tracing of the appliance on a "record card" before the adjustment of the appliance. The careful use of a tracing in applying force, with the appliances here recommended, taking definite short steps at intervals of one week, makes the movement of the bone and teeth painless, as is borne out

* Jackson, "Orthodontia," 1904, p. 113.

by experience.* The appliance is made on an accurate model. It is removed from the model and carefully adjusted to the patient's teeth; then the appliance is placed on a record card, and a careful pencil tracing is made of the outlines of the appliance, especially of the partial clasps and finger springs.

When force is to be caused on the teeth by any parts or springs of the appliance, as for expanding the arch laterally or moving incisors, a pencil dot mark should be placed by the side of the tracing, at the distance and in the direction it is intended to bend the springs or arms of the appliance for causing force, and the spring is bent a corresponding distance. For the first and any subsequent applications of force, the change should be one millimeter or less, seldom more.

The card is ruled from above downward. The date of the change in the appliance is made to agree with the new tracing, and is inserted in a column at the right. A light line is drawn from the date to the dot mark, which completes the record of the change that is made. Every subsequent change in the shape of the appliance is recorded by one or more dot marks as required, and the date is noted in the column in the same manner, with a line connecting them. If a change be made in two or more springs on the same date, the lines extending from the dot marks to the date should converge.

All changes in the form of an appliance for causing force should be indicated by dot marks; the dot marks corresponding with the new changes, and therefore being successive; the spaces between the dot marks are known as "steps."

* Rodgers, *Cosmos* 1907, p. 1288.

The visits for changing the force are made at intervals of one a week. Later, if desirable, the visits may be made once in two weeks or more.

By using a pencil tracing of the appliance in this manner on a card, the card then being filed, a permanent record is kept of each change made in the appliance, the date, and also the distance the teeth have been moved.

With an appliance made as described there should be no pressure caused on the gum tissues; by following the plan of the record card—that is, indicating only short distances or steps by the dot marks—and by leaving an interval of seven days between visits, the patient can be assured that there will be no pain or special discomfort in the regulation of the teeth.

Generally, only a few definite steps by the tracing, and corresponding changes in the appliance, are required in order to move the teeth as far as desired.

DEVICE FOR LATERAL EXPANSION OF ANTERIOR PART OF ARCH.

The force needed for the lateral expansion of the arch, with an appliance having a palato-distal base wire, is caused by grasping with the fingers the ends of the arms and pulling outward on them until the base wire is bent sufficiently to cause the ends of the arms to rest with the new dot marks of the tracing. Changes in the shape of the appliance should never be made by guess, but always by the tracing.

DEVICE FOR LATERAL EXPANSION OF ANTERIOR AND DISTAL PART OF UPPER ARCH.

This device consists in a palatal base wire for expanding laterally both

the anterior and the distal part of the upper arch. The appliance is made by first forming a large base wire to cross the distal part of the arch, following the palatal curve, with the arms free and shaped to extend forward to the canines, where each is bent in a short curve to extend backward to the last molar. The latter portion of the arms is shaped to rest on partial clasps arranged on the lingual side of the canines, bicuspids, and molars, thus forming a body for the anchorage portions of the appliance.

Finger springs for any purpose can be attached to the arms or anchorage of the appliance.

It will be seen that the management of this form of an appliance for expanding the anterior part of the arch is the same in principle as the one previously described—that is, by following the plan of the tracing and grasping with the fingers the anchorage portions and pulling outward, bending the base wire until the arms agree with the new tracing in the anterior part.

When the distal part of the arch is to be expanded, dot marks on the tracing are made opposite the arms, and the arms are pulled outward with the fingers until they agree with the new tracing, which bends the base wire thus [shown].

With this arrangement the base wire of the appliance can be adjusted for expanding laterally either the distal or the front part of the arch, or both, with exactness and in a few moments.

DEVICE FOR LATERAL EXPANSION OF WHOLE UPPER ARCH.

This appliance represents a different form of palatal base wire for expanding laterally the whole upper arch. It is suitable for most cases requiring ordinary lateral expansion, especially when a lesser degree of expansion is required.

The base wire curves backward, following the deeper portion of the palatal vault, extending to the last molar on either side, where it is bent forward, forming arms, to rest on partial clasps arranged on the lingual side of the anchorage teeth, to which they are soldered with the ends of spring clasps and finger springs, the arms strengthening the anchorage portions of the appliance.

With this arrangement of the base wire the appliance is not quite so bulky as the one already described, which has curves in the wire opposite the first bicuspids, necessarily taking up some space. But the base wire in either form does not cause discomfort or interfere with speech.

Springs for any purpose can be added to the anchorage portions. For expanding the front part of the arch, the arms are pressed outward, bending the base wire. In expanding the distal part of the arch, pressure is caused which bends the base wire thus [shown].

DEVICE FOR LATERAL EXPANSION OF LOWER ARCH.

This appliance consists of a lingual base wire for expanding laterally the lower arch. The base wire is of the same general form as the one previously shown for expanding the upper arch. It is shaped to follow the lingual curve of the arch, resting below the margin of the gum, extending to the last molars, where the ends are bent forward, forming arms to rest on partial clasps arranged on the lingual side of the anchorage teeth, to which they are soldered with the spring clasps and finger springs.

When the arch, either upper or lower, needs only a little expansion, generally

no especial anchorage to the canines other than the resting of the appliance on their lingual surface is required. When more expansion of the arch is needed, a stronger anchorage is generally employed. A collar with a lingual lug is cemented to each of the canines to sustain a wire finger extending forward from each of the arms of the appliance.

"V-SHAPED" NARROW UPPER ARCH.

In V-shaped narrow upper arches extreme upper protrusion is typical.

The roof of the mouth is the floor of the nose. Changes in the shape of the palate processes of the maxilla and of the intermaxillary bone change the floor of the nose. When the dental arch is narrower than it should be, and the incisors are prominent, the intermaxillary bone generally has a greater than normal antero-posterior measurement. The change in the shape of the intermaxillary bone is indicated by the change in the anterior curve of the arch and by the line of the intermaxillary suture.

DIVIDING THE ARCH INTO SECTIONS.

When the arch is expanded laterally and the incisors are forced inward, the lateral measurement of the intermaxillary bone is increased, and the antero-posterior measurement is lessened.

In the study of the dental arch for the purpose of correcting irregularities of the teeth, increasing the lumen of the nares, or other purpose, it is an advantage to divide the arch into three divisions, sections, or segments—two lateral maxillary divisions and one intermaxillary division. These divisions of the upper arch have natural borders, these being separated by the lines of the sutures. The divisions are—*Right maxillary division*, which contains the molars, bicuspids, and canine, on the right side of the arch. *Left maxillary division*, which contains the molars, bicuspids, and canine on the left side of the arch. *Intermaxillary division*, which contains the four incisors. These divisions can be symbolized as follows: R–M–D, L–M–D, I–M–D.

For convenience, the lower arch should be divided into similar divisions.

NASAL STENOSIS.

Over thirty per cent. of children suffer with nasal stenosis. Of these stenoses a large percentage are caused by lack of normal nasal capacity, due to bony constriction of the dental arch from arrest or lack of development.

When the conditions will not permit normal nasal breathing, the arches will not develop normally.

If the upper arch does not develop laterally as much as it normally should, the palatal processes and the intermaxillary bone usually become thickened, and often arch higher than they should.

To improve the breathing, the conditions are treated by the rhinologist by removing adenoid growths, polypi, or thickened membranes, reducing congestion, correcting improper cartilaginous development, any deviation of the septum, and when necessary excising more or less of the turbinated bones.

When by these changes nasal space is not sufficiently increased to establish normal breathing a chisel with a mallet is sometimes employed by the rhinologist for removing the maxillary ridges of the floor of the nose, or the thickened portions generally found by the side of the septum.

After careful treatment as noted, it

is often found that the conditions have not been sufficiently benefited to permit normal breathing, and the patient continues to breathe through the mouth.

INDICATIONS FOR INCREASING THE NARIAL OPENINGS.

This and other experiences encourage the orthopedist to expand the arch in a manner that will enlarge the nares sufficiently to permit normal breathing.

In any case where arrest of development of either the upper or the lower arch of a young patient is suspected, the orthopedist should make an examination in order to determine whether the breathing is normal and whether there is sufficient room in the arch for the proper complement of teeth. If there be insufficient space for the teeth, or deficient nasal space, the arch should be expanded early, or before development at the sutures connecting the divisions of the arch becomes inactive. In the case of a child with deciduous teeth, if the interproximal spaces between the incisors and the incisors and canines should not gradually increase by the natural lateral growth of the bone and process, in order to provide for the eruption of the permanent incisors, early lateral expansion of the arch should be resorted to.

It will be observed that the deciduous incisors are always much narrower than the permanent incisors, but generally the latter gradually wedge their way into the arch, causing its expansion.

It will also be noted that the condition is different in the intermaxillary division of the arch as referred to than in the lateral maxillary divisions, as with the latter the deciduous teeth are usually broader than the permanent ones that are to occupy their place. This increase of space is more apparent with the teeth of the lower than with the upper arch. The laws governing these conditions should be kept constantly in mind in the study of the development of either the upper or lower arches.

In case there is not sufficient room in the arch for the normal eruption of the permanent teeth, the orthopedist should expand the arch in a manner that will encourage progressive natural development of both the dental arch proper and the lateral walls of the nose. The dental arch in these cases generally requires both lateral and anterior expansion.

The proper lateral expansion of the upper dental arch, especially in young patients while in their developmental stage, increases the narial openings and improves the breathing.

The writer, in studying the natural arrangement of the bones of the face, conceived the idea of increasing the nares to favor free breathing by moving the teeth bodily in expanding the upper arch.

The expansion is accomplished by grasping the crowns of some or all the anchorage teeth and moving them bodily outward with the alveolar process and true bone.

METHOD OF EXPANDING THE DENTAL ARCHES TO INCREASE CAPACITY OF THE NARES.

The principal object in preparing this paper was to describe a method for expanding the dental arches in a manner that would increase the capacity of the nares to improve the breathing. Several methods have been devised by the writer. For lack of time but one method will be mentioned here; others are prepared for a later paper.

IMPROVED ANCHORAGE.

An improved method of anchoring an apparatus to the teeth for the expansion of the arch, moving the teeth bodily, and for other purposes, consists in first cementing to each of the upper and lower canines a thin broad collar with a buccal lug or tube, located to rest near the gum; similar broad collars with disto-buccal lugs or tubes, arranged to rest near the gum, are cemented to each of the distal molars of the arch.

To the anterior part of the arms of an appliance made as described is attached a wire clasp, one on each side of the arch. The wire clasp is arranged to rest at the junction of the canine and lateral incisor, resting well in the groove, and to extend over the arch to the gum line, where it is bent backward and downward in a curve to engage with a lug on the collar cemented to the canine. The end of the clasp is curved forward on itself, forming a hook. Similar wire clasps are attached to the distal part of the appliance, one on each side, the clasps being shaped to pass around the last molars of the arch, and rest above the lugs on the collars.

The wire clasps and lugs on the collars are known as the locking device of the appliance.

With this form of anchorage, the appliance can be detached from the teeth only by unlocking the wire clasps from the lugs on the collars, which the patient easily does in a moment by the finger. With this arrangement of anchorage there is nothing to interfere with any desired change in the correction of the occlusion of the teeth or for any other purpose. If any parts of the appliance should become bent and interfere with the occlusion, they can be readily corrected by re-shaping the springs.

Force for expanding the arch laterally is gained by removing the appliance from the teeth and pressing outward with the fingers on the ends of the arms sufficiently to bend the base wire a little at a time, and reinserting the appliance. The spring of the base wire produces lateral force outward on the sides of the arch, causing its gradual expansion.

Additional applications of force are usually made but once a week or at longer intervals, the object being to cause slight continued force upon the teeth, keeping up their steady progressive movement in one direction, in that manner stimulating the natural development of the maxillary processes and intermaxillary bone at the sutures and other parts. These bones are numbered with the flat bones, which are increased by development at their edges.

It will be observed that the roots of the deciduous and of the permanent canines project well up to, and sometimes within the outer bony walls of the nose. The upper third of the roots of the molars, bicuspids, and canines are surrounded by true bone.

In any case where the greatest benefit to the conditions of the nose from expansion of the jaw is desired, the lateral maxillary divisions of the arch, or columns of teeth with their roots, should be moved outward bodily. This bodily movement of the teeth with the process and bone proper, if produced gradually, exerts a definite influence in the lateral expansion of the nares.

DEVICE FOR MOVING TEETH OUTWARD BODILY.

The moving of these teeth bodily, even though it be difficult, is accomplished

in a simple and painless manner by first cementing to the canines, on each side of the upper arch, a broad collar as described, having a lug on the buccal surface located to rest near the gum, and a lug on the lingual side of the collar at the gum line; also a similar collar, with a lingual and a disto-buccal lug located near the gum, should be cemented to each of the distal molars, one on each side of the arch, as previously described. Each of the teeth that are to be moved bodily outward requires that a broad collar be cemented to it, having a lingual lug located at the gum line and a slightly hook-shaped buccal lug located near the gum.

When, in addition to the anchorage to the canines and distal molars, other molars and the bicuspids are to be moved outward bodily, a small tube is soldered longitudinally on the buccal surface of the collar on the last molar, resting below the lug. A similar tube is soldered perpendicularly to the disto-buccal surface of the collar on the canine.

Through the tube on the molar passes a small wire, about No. 19 gage, known as a "sustaining bar," which extends forward, following the gum line to the canine, where the end is formed into a vertical loop shaped to enter the tube from below upward. To cause action, the sustaining bar is so adjusted as to spring downward to engage with the buccal lugs of the collars.

It will be noted that the lingual lugs on the collars are located at the gum line and the appliance arranged to rest upon them. Therefore, in making an upper appliance to move the teeth bodily in the lateral expansion of the arch, partial clasps are first shaped to the collars on the lingual side of the teeth to be moved, resting on the lingual lugs.

A palatal base wire with the ends bent forward forming arms, and wire clasps and other springs, are adjusted in place and soldered.

The appliance when adjusted rests on the lingual lugs, in effect pressing upward, while the wire clasps extending over the arch and the sustaining-bar passing above the buccal lugs in effect press downward; with this arrangement of the anchorage, the arms of the appliance when in action force bodily outward all of the teeth sustained by this form of anchorage.

When expanding the upper arch, the lower arch should always be expanded in the same manner, sufficiently to keep the arches equalized.

DEVICE FOR EXPANDING LOWER ARCH.

This appliance is designed for expanding the lower arch. It is made with wire clasps and when necessary a sustaining bar similar to the one described, and has a lingual base wire, No. 10 or 9, shaped to follow the lingual curve of the arch to the last molar, where the ends are bent in a short curve to extend forward, reaching to the canines, forming what are known as the arms of the appliance. The arms give strength to the anchorage portions.

Force for expanding the anterior or distal part of the arch is caused by pressing outward on the mesial or distal ends of the arms, which bends the base wire; in doing this, one should always use a tracing.

SUSTAINING BAR FOR PREVENTION OF TIPPING.

When the arches are being equalized, usually it is necessary to expand laterally

the anterior part of the upper arch to permit the lower arch and teeth to take a correct position. When continued force with rubber equalizing bands is applied to the lower and upper anchorage teeth in equalizing the arches antero-posteriorly, they are sometimes tipped forward in the line of the arch or tipped backward, either of which is undesirable. To prevent this, a sustaining bar is utilized by adjusting it in the tubes on the collars cemented to the anchorage teeth, as described under moving the teeth bodily.

When the bar is applied in the tubes, it will not permit the teeth to be tipped forward or backward in their sockets without the wire is first bent for that purpose; in the same manner, the device is utilized for righting teeth that have become tipped in the arch at any stage of their regulation, by bending the ends of the bar correctly and re-inserting it in the tubes.

The bar is used for sustaining other molars and bicuspids, for moving them bodily, and when necessary, for elevating them. It is equally practical for sustaining the teeth of the lower arch.

Discussion.

Dr. A. H. Ketcham, Denver, Colo. This paper of Dr. Jackson's is very interesting, and upon the general principles therein outlined we can all agree. I think, however, it would have been better had the title of the paper been "A Method of Expansion of the Dental Arches, to Aid in Establishing Normal Respiration."

The essayist has mentioned that since 1887 he has been calling attention to the improvement in breathing which follows the expansion of the upper arch, and I believe that an improvement in breathing follows expansion in practically all cases where we expand the maxillary. It would be very interesting, indeed, if the essayist would specify the publications in which we can find his first mention of the expansion of the arch to improve the nares. I for one wanted to look it up and become familiar with the early writings on that topic.

The essayist stated that the majority of cases do not require expansion in the region of the molars. To my mind, it is a question as to whether it is the majority or the minority of cases which do not require expansion. We cannot determine that without careful measurements in an overwhelming number of cases reaching into the thousands.

As to the Jackson regulating appliance, there is no question that Dr. Jackson can do all he claims with his appliance, and do it painlessly. To my mind the effectiveness and the use of an appliance without pain and discomfort to the patient depends largely upon the skill and good judgment of the operator. We can take any appliance and so adjust it as to cause pain, if we do not apply it with the utmost care and skill, which of course come with practice. Still, some men who are practicing orthodontia, while they can treat their cases successfully from the standpoint of practical results, never seem to possess that intimate sympathy with child nature and that nicety and good judgment which show them the maximum pressure to be used in each case, so that they can treat these cases painlessly. The majority of orthodontists, however, can secure a beautiful result painlessly with the expansion arch.

The essayist says that orthodontia is an exact science, and that the appliance should be used with the tracing. In my

opinion, the amount of expansion depends upon the operator's judgment, even when he is using the tracing. Of course, with the tracing he knows how much pressure he is applying each time. Some children will be happy and comfortable with a pressure which would cause other children to complain. Dr. Jackson advises never to bend the appliance more than 1 mm. I believe that is correct.

Dr. Hawley has a set of charts showing the size of normal adult dental arches —which he has designed from careful measurements of the incisors, and he therefore approaches exact science much more closely than an operator who depends on his own judgment.

Of course we observe the long narrow teeth and long narrow dental arches; also the short broad type of teeth, with the skull and face also broad. In these short and broad heads, a short broad arch is required to be in harmony with the rest of the features. In the long narrow head, the long narrow arch is required to go with the long narrow incisors. Nature has given us the broader bicuspids and molars from the mesio-distal measurements to go with the long narrow incisors to make the long narrow arch. Even Dr. Hawley's measurements are not quite exact science, but they approach it more closely than the individual judgment of the operator.

Yesterday a member who came to my clinic told me that he was constantly prone to get the molars too far out buccally. I told him that he bent the ends of the arch out too much. He informed me that he "was not using the arch, but was using a Jackson appliance." I told him, then, that it was because he did not know how to use the appliance—because if any be used, of whatever type, it is not necessary to obtain too much expansion, if sufficient experience has been had in orthodontia to know how to adjust an appliance.

In using the arch, the patient needs to present but once a week, and some patients but once in two weeks. Furthermore, the arch cannot be easily removed by the patient, or bent and gotten out of adjustment, as it is possible to do with a removable appliance. The point has been made that the removable appliance is cleaner than the fixed appliance, but my experience has been that with the fixed appliance the patients' mouths are kept cleaner than they ever have been before, simply because more attention is paid to oral hygiene, and at each visit the mouth is carefully cleaned and sprayed, the teeth polished with pumice, if necessary, and everything is done to impress upon the patient's mind that a clean oral condition must be maintained.

From careful reading of Dr. Jackson's paper, I could not be certain whether he thought nasal stenosis preceded the constricted dental arch or was a condition following it. Of course we know in the case of a child suffering with a slight cold, having the "snuffles," that the mucous membrane of the nose becomes thickened, the adenoid tissue becomes enlarged, and nasal stenosis often results. When this occurs, as it usually does early in life, the growth of the bony part is interfered with. [Dr. Ketcham showed slides of cases—see Figs. 1–12, illustrating his paper read before the Southern Branch of the N. D. A., and printed in this volume.]

Sometimes orthodontists have made the statement, and rhinologists as well, that the floor of the nose is lowered by the operation of expanding the arch. That has been questioned, for we know that in its development the whole face

grows downward or forward, the nasal space and the dental arch increasing in size. We also know that the roof of the mouth is higher, sometimes, in relation to the occlusal surfaces of the teeth than it was before the treatment. The reason therefor is that we have stimulated growth in the alveolar process and in the bone above, and have helped to bring everything out and down, assisting nature.

It is possible to have nasal stenosis follow a constricted dental arch, but it would not be due, in that case, to adenoids. For instance, the lack of development of the upper arch may be due to the early loss of some of the teeth, either deciduous or permanent, and to disuse, in consequence of which the arch does not develop normally, and the nasal bones do not have an adequate foundation to rest upon. The nasal cavity then is not as large as it should be, but generally speaking, I believe that nasal stenosis precedes a constricted upper arch.

Dr. Jackson is right about the advantages to be gained by moving the roots of the teeth outward, and no doubt his appliance will do it. The roots of the teeth may also be moved outward in the use of the expansion arch by a modification of Dr. Angle's "working retainer," which is described in the March 1910 *Cosmos*. In this modification, which I believe is Dr. Dewey's, instead of running the spurs which are soldered to the arch into the tubes upon the teeth, the arch is placed near the gingival margin of the teeth with spurs, like fingers, coming down perpendicularly over the labial surface of each tooth, but not touching until they reach the incisal end of the incisors or the buccal cusp of the bicuspids. The arch stands away from the teeth at their necks. A wire is passed around the neck of the tooth and arch, drawing the root of the tooth outward. A band may be put upon a tooth with a little lug upon its lingual surface to keep the wire from pressing on the tissues, while the spur or finger presses the crown of the tooth inward.

I do not believe the rhinologist should perform a radical operation until after the orthodontist has expanded the dental arch. It is necessary for the rhinologist to remove adenoid tissue, but he should not, for instance, perform the submucous resection of bone, trim off the turbinate, or make as radical an operation as Dr. Jackson suggested they sometimes do, until the orthodontist has expanded the arch and secured as much breathing-space above as possible. Then, if necessary, the rhinologist can go ahead and do his worst—or best.

In closing, I would repeat that our patients may be treated painlessly and the nasal cavity can be improved. It is a matter not of the appliance so much, as of the individual skill in manipulating the appliance, just as one operator may take a set of excavators, or burs and pluggers, and put in a gold filling and hurt the patient considerably, while another will make the whole filling painlessly and equally as well with the same instruments.

Dr. B. Frank Gray, Los Angeles, Cal. While I might enter at once into a discussion of the expansion of the dental arches, with especial reference to the bodily movement of the teeth and to Dr. Jackson's method of doing this work, I have the belief that some understanding of the etiology of those cases of malocclusion requiring such treatment, as well as of the indications for the treatment itself, is of first importance.

Dr. Jackson has in one part of his

paper practically stated that constriction of the dental arches causes nasal stenosis. Granting the truth of this, I still think his tendency is to approach the subject from the wrong direction. In a very great percentage of cases of this type the nasal stenosis is responsible for the constriction of the dental arches.

Hypertrophy of the lymphoid tissue in the dome of the pharynx, commonly termed "adenoids," is responsible for nasal stenosis in very many cases. This hypertrophied lymphoid tissue prevents the passage of the normal quantity of air through the nose. The extent of the abnormal growth measures the amount of air which may pass through. Hypertrophy of the turbinate bones, polypi, etc., are contributing factors to the same condition. The nasal occlusion, whatever its source may be, causes mouth-breathing, with the characteristic results which such a perversion of normal respiration brings about. With the air-current passing through the mouth, the tongue no longer occupies its usual position in rather snug contact with the roof of the mouth and against the teeth. At the same time the constantly open mouth produces an abnormal pull of the muscles at the side of the mouth, and there is no longer the normal pressure of the lip against the upper incisors. The influence of the tongue from within and of the muscles from without, when properly balanced, are great factors in the maintenance of a normal arrangement of the dental arches. But with the lack of pressure of the tongue from within and the abnormal pull of the muscles at the side of the mouth, it may be understood why the dental arches may not develop to their normal width, while the protrusion of the upper incisors so often in evidence is explained from the lack of proper lip function.

At this stage the telescoping of cause and effect is often noticeable, as the irregular dental arches, especially of the prominent incisor type, make normal breathing impossible, even though the rhinologist has made a clear passage for the air through the nose. Hence the great necessity of establishing a normal arrangement of the teeth in such cases.

You certainly do not get a normally developed nose until you establish normal function of that organ, but the point I wish to make is that nasal stenosis, which arises from such causes as I have indicated, is much more likely to cause a lack of development of the dental arches than is the lack of development of the dental arches likely to cause nasal stenosis. To a lesser extent we find this series of cause and effect starting on the dental side, and in such cases expansion of the arches at the proper time should have a marked effect in stimulating normal development of the nose, which includes, of course, the bones forming its walls, providing that adenoids or other abnormal growths are not present.

A good point of diagnosis is that which has been dealt with rather thoroughly by Dr. Varney Barnes. He believes that at a period previous to the loss of the anterior deciduous teeth, there should appear what he terms "normal growth spaces" between these teeth. In the absence of such "normal growth spaces," he believes expansion of the dental arches to be necessary in order to provide room for the permanent teeth. I believe this is true, and it may be borne in mind that at this immediate time the roots of the deciduous molars are not absorbed to any considerable extent, and

their outward movement would carry with them the crypts of the developing bicuspids. I do not think Dr. Jackson called attention to the fact that expansion of the deciduous molars at a time when the roots were well absorbed would fail to be productive of any benefit. At the age of from eight to eleven years the use of the X ray may be necessary in order to determine to what extent absorption has progressed.

It is reasonable to assume that in the absence of these so-called normal growth spaces, the nose is also lacking in its normal development. This is a second good reason for expanding the arches at this time, and is in line with Dr. Jackson's conclusion.

As to the immediate methods employed by Dr. Jackson in the bodily movement of the teeth outward, as I understand it, he expects to secure in a limited time the same effect that would ultimately be secured in case the teeth were tipped buccally. It has been shown many times that a normal development in the apical region follows treatment by the latter method. This is especially true in the cases of young children.

I agree that the two important considerations in this work are, first, to secure as nearly as possible an ideal result, and second, to secure this result with the least amount of discomfort to the patient. It is not worth while to waste our energy in strenuously defending appliances, for it is a well-known fact that one operator will do efficient work with an appliance of a certain type, while another man may fail to secure results with the same appliance but may make an eminent success with one of a different type.

It must be remembered in this question of the patient's comfort that the appliance used is only one part of the treatment. The skill of the operator, or his lack of it, not only determines to a wonderful extent the result of the operation, but stands in direct ratio to the amount of discomfort caused to the patients.

Dr. Jackson's method is ingenious, and I am sure that he can do effective work with it. Dr. Case accomplishes good results in the bodily movement of teeth, and while Dr. Angle very often prefers to use the ordinary expansion arch in this work, he does so with a knowledge that nature takes care of the normal development at the apices of the roots; but for more mature cases he has devised certain appliances for the outward movements of the roots themselves.

I am very glad to see Dr. Jackson's presentation of this topic. When it comes to the subject of nasal stenosis and deficient development of the dental arches, we soon get into a circle of cause and effect, and unless we are careful we do not know in which direction we are moving. There is room for much work along these lines, and certainly the dentist owes to his *clientèle* the benefit of a fair degree of understanding of this subject.

Dr. T. P. Hinman, Atlanta, Ga. It seems that there are two schools of orthodontia, as there are different schools of medicine. There are several viewpoints, *e.g.*, that of the orthodontist and that of the general practitioner of dentistry. The general dentist has to make a living and do a little tooth-regulating also.

I have been using the Jackson appliance for a good many years and have found it to be very satisfactory. It can be used successfully along with our general work, by making the movement once a week accurately by the chart. We are not all so situated that we can send our

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patients to a specialist, and it may be fortunate that we are not. The Jackson appliance, if made properly, has several advantages, and one of these is, that after regulating has been completed it is not necessary to spend four or five hours in building a retaining appliance. The best appliance for holding the teeth in their proper alignment is the one we have used in moving them.

Someone complained about too much distal expansion resulting from Jackson's appliance. This must have been due to the base wire being not large enough. The base wire was probably made out of No. 14; if it had been made out of No. 9 or No. 10, no lateral movement of the molars during expansion would have occurred.

As to pain being caused by wearing the appliance, I have been successful in moving the teeth without much pain, but I cannot say that I do not produce any pain whatever.

I know it to be absolutely true that in the lateral movement in the expansion of the arch by means of the Jackson appliance, if it is properly constructed, the teeth are not tilted as with an outside arch bar. In the illustrations shown on the screen by Dr. Ketcham you would notice that after his expansion of the arch there was considerable outward inclination in the molar and bicuspid region. After four years, at the age of nineteen, this was not rectified, and therefore, if we have an appliance that moves the teeth bodily through the arch, I believe that we obtain a more esthetic effect by this than by the other method.

We also have the advantage of being able to thoroughly cleanse the teeth during the process of regulating. Every time the patient comes to the office the appliance can be entirely removed and the mouth placed in a sanitary condition. This can be done with the arch bar, too, but it takes much more time to take out that appliance and readjust it.

Dr. R. D. Robinson, Los Angeles, Cal. Nobody deplores the necessity of making such remarks as I am going to make more than I do; but I believe the time has come—that it arrived a good many years ago—when it is not right for any man to appear before an association of this kind and claim originality for the conception of appliances to which exception might be taken.

Dr. Jackson said that he has conceived the idea of overcoming nasal stenosis by the expansion of the upper arch. I want to refer Dr. Jackson to a paper published in the *Pacific Dental Gazette* in December 1905, which was read before the Lewis & Clark Dental Congress, in which exactly this same appliance was demonstrated. A great many men have discussed this appliance for a great many years, as for instance the late Dr. Crawford of Nashville.

This by way of criticism. Dr. Jackson is my friend, and I am sure he will not take exception to my statement.

Dr. Jackson is doing excellent work, and he accomplishes the results he claims by securing a more ample breathing-space by this operation.

As far as moving the teeth buccally and in a body is concerned, this can be accomplished by another method, *i.e.* by soldering longitudinally to the long side of the tooth a spur for the iridio-platinum arch. [Demonstrating.] The spur is slipped into place, and the extension will take place as much at the end of the root as it does at the crown, or more, or less, as desired. The operator has absolute control over the movement of the entire tooth, and I believe that method to be

fully as efficient or even more so in my hands than Dr. Jackson's. Dr. Jackson's appliance may be more convenient in his hands, but in my operations I find this other one to be more efficient.

As far as cleanliness is concerned, I believe that the appliance I have just described is fully as cleanly as Dr. Jackson's, and perhaps more so, because he has a flat surface in contact with the tooth, affording a place for the lodgment of particles of food, whereas in the appliance I have described the band is soldered on, and nothing can come in between the band and the tooth, which renders it more cleanly and sanitary and does less damage to the tooth and the surrounding tissues than the other appliance, which requires cleaning every week.

Dr. JACKSON (closing the discussion). I am glad that such a good discussion has been brought about on this subject, which deserves a great deal of attention.

Regarding the statement made by the last gentleman, I think I ought first to speak of his assertions concerning the cleanliness of the appliance, its removal once a week, and so forth. The patient is always instructed to remove the appliance three times a day, which can be done with perfect ease. Any appliance that I construct or advise is and should be readily removed by the patient in a few moments. I stated that in my paper. If the appliance is not kept polished as brightly as it was when first put in the mouth, there is something wrong. It is your duty to see that the patient's mouth, teeth, and the appliance are kept thoroughly clean, and that the metal remains bright and polished.

Many dentists are making the mistake of advising against the employment of the ordinary base metals in regulating appliances, because they waste away. They do waste away if they are not properly cemented to the teeth. Base metal is being used for filling teeth. The same men who advocate the use of amalgam for saving teeth maintain that nothing but gold should be used for expansion bars and so forth.

Here is another consideration. We are trying to progress; we want to know something more on this subject. Amalgams are of about the same composition as the German silver materials, so we should not abandon the latter unless we abandon the amalgams. Antiseptics are very harmful to base metals, which deteriorate and turn black.

I want to warn the operators who use fixed apparatus in the mouth against too strong washes or solutions, which will disintegrate base metals.

That is the purpose of an easily removed appliance—that it can always be taken out and cleansed, and that no antiseptic is needed while the apparatus is in the mouth. We expect the appliance to be just as bright at the end of one year as it was when it was put in. That is why chemically pure tin was chosen as a solder.

The use of spurs on the bar is not new. It was devised by Dr. Angle. I wonder why no one has called attention to another apparatus which has two bars, one connected with the other, which was brought out thirty to forty years ago, and used very extensively for regulating and moving teeth bodily. I am certainly far from claiming that I am the inventor of the only system of moving teeth bodily. I have not claimed anything that is not my own, and I am giving it to you that you may carry it to greater perfection.

Regarding nasal stenosis, I do not think that I can be misunderstood if you

read my paper carefully. We expand the arches only when we find such a condition as renders it necessary. As to the time of beginning, it was stated years ago that regulation of the teeth should be begun while they erupt, or as soon thereafter as practicable. This remark has been quoted many times, but no orthodontist has given its originator credit.

The distal part of the arch in about eighty-five per cent. of cases is broad enough in my experience.

Expansion of the arch should be instituted as early as possible, but only if necessary. I spoke of the spaces between the teeth. When these spaces are not present, it is our duty to expand the arches immediately. When the deciduous bicuspids are being resorbed, even though the roots are but partially resorbed, I do not hesitate to move them bodily, because that aids in the expansion.

The advocates of the Angle system claim that if the canines are moved out, the whole arch need not be expanded. I prefer, however, to expand the whole arch.

Nasal stenosis preceding constriction is due to some constitutional or climatic condition. It is our duty, then, to thoroughly correct this trouble. We should so educate the people that they will bring their children to us for the purpose of examination, so that we can discover these conditions at an early date.

It is not my purpose to disparage anyone, but I merely wish to state that we are all working for one great cause, and are trying to improve abnormal conditions. I have pointed out a system that is very convenient for the patient, the children never complaining. With this system, as I stated, combined with the use of the chart and the tracing, the arch can be expanded to any desired extent.

The Chairman then declared Section I adjourned.

SECTION II:

Operative Dentistry, Nomenclature, Literature, Dental Education, and Allied Subjects.

Chairman—L. L. Barber, Toledo, Ohio.
Secretary—F. L. Platt, San Francisco, Cal.

FIRST DAY—Tuesday, July 19th.

The first session of Section II of the National Dental Association was held at 2 P.M., Tuesday, July 19, 1910; Dr. L. L. Barber, Toledo, Ohio, chairman, presiding.

The Chairman. The first paper of this afternoon will be read by one who is very well known to all of you, Dr. J. V. Conzett of Dubuque, Iowa, and is entitled "The Gold Inlay," as follows:

The Gold Inlay.

By J. V. CONZETT.

In the opinion of the writer there is no better filling than a good gold foil filling. Gold foil in the hands of the man who is an expert in its use is a material that is unsurpassed for stability and permanence; fillings made with it have demonstrated their perfection by the only test that is a fair one, the test of time. We *know* what gold foil will do in the hands of the master workman, therefore it requires no apologies at this late day.

THE GOLD FOIL FILLING: ITS VIRTUES AND DRAWBACKS.

While it is true, however, that gold foil is a splendid material in the hands of the expert, it is also true that in the hands of the man who has not thoroughly mastered its use, it is the poorest material that can be placed in a tooth, for, if it is not perfectly adapted to the cavity walls, it does not exclude the moisture and the organisms contained there-

in, and the process of recurrent caries begins almost immediately. Because gold foil is a difficult material for the average practitioner to use successfully, the advent of the gold inlay was hailed with delight by the greater part of the profession. It has come, and it has come to stay. It has a large and very important field of usefulness, but like any new contrivance that has taken the profession by storm, it is producing and will continue to produce a very large crop of failures.

I have been asked to discuss the inlay from the standpoint of a gold-foil enthusiast, and in doing so I want it distinctly understood that I do not enter a discussion of the subject with any disposition to "knock" the inlay, for my studies of the subject have made me its firm friend, and it is being used in an increasingly larger measure in my practice every year. There are some features of the inlay, however, that need emphasis, and some mistakes that are being made that should be pointed out.

CONTRA-INDICATIONS AGAINST THE GOLD INLAY.

In the first place the inlay is not indicated in every cavity. There are cases in which the gold foil filling is much to be preferred. In cavities involving the approximal surfaces of the incisors, for instance, an inlay is not indicated, for the reason that a greater amount of tooth tissue must of necessity be sacrificed in order to place an inlay in these positions than would be required for placing a filling. I would not think it good practice to place any filling in any tooth that would make necessary the sacrificing of tooth substance that could be saved with some other material. In order to place an inlay in these cavities, the tooth must be cut away either labially or lingually sufficiently far to allow the inlay to be placed into the cavity. This is not true of the filling, for in these positions only enough of the labial or lingual surfaces need be cut away to insure sufficient extension for prevention, and if the cavity is deeper pulpally, there is no further need of the sacrifice of any more of the external portion of the tooth than that necessary to obtain strength, for the gold can be inserted in the foil form from the approximal surface, and the filling built up with the sacrifice of a minimum amount of tooth tissue.

An inlay is not indicated in the small pit cavities in the molars and in lingual surfaces of the incisors for the same reason, viz, the needless sacrifice of good tooth substance.

INDICATIONS FOR THE GOLD INLAY.

The inlay *is* indicated in all positions where the operator's judgment prompts that he can make a better operation with an inlay than a filling. No two men are alike, and it would be a mistake to insist that every tooth must be filled in this or that manner. Every operator must be the judge of his own ability, and the operator who uses a filling in a place where he knows he cannot make a good one, and in which he could make a good inlay, is doing a grave injustice to himself and his patient.

Cavities in all of the surfaces of the molars and, in many instances, in the surfaces of the bicuspids, have in the past far too often been filled with amalgam because the operator felt that he could not make a perfect gold filling, and being an honest man he preferred to use a material that would save the tooth.

To all such men the inlay is a priceless boon, and should be used by them in all such cases.

The inlay is demanded by many patients who have in the past suffered the tortures of the gold filling in the hands of men who were not experts in its use, and who, after having had one inlay made, will not permit the placing of another foil filling. There are many cases in which the inlay is confessedly indicated even by the most conservative foil operators, where formerly crowns or large amalgam restorations would have been employed.

Wherever the inlay is used, whether in the places which the writer thinks are the proper ones for inlays or not, there are certain fundamental principles that must be observed, or the inlay will surely fail, no matter how perfectly it may have been made.

PRINCIPLE OF CAVITY PREPARATION.

The law of extension for prevention is as imperative in the preparation of a cavity for an inlay as it is in a cavity for the reception of any other filling material. This point needs emphasis by reason of the fact that many operators seem to think that the cement is going to save the tooth in spite of the lack of scientific cavity preparation on their part. In some inlays that I have seen, in the cavity preparation only the carious portions seemed to have been removed, then the model was made and the inlay inserted in that cavity. Of course these inlays failed in a very short time, and the inlays were blamed, while by rights the blame should have been placed upon the operator, who did not know how to prepare a cavity for the reception of an inlay. Many operators seem to think that it is necessary to shape the cavity so that it has strong divergent walls in order that the model can be properly withdrawn, and the consequence is, that in cavities in the approximal surfaces of bicuspids and molars, the labio-gingival and linguo-gingival angles are much too far within the embrasures, and therefore within the area of susceptibility, and a future recurrence of decay is not only a probability, but a reasonable certainty.

We cannot place our confidence in the cement to take care of margins that are in places which cannot be kept clean. The same preparation in the occlusal surfaces leads to the flaring of the walls of the cavity to such an extent that there is no frictional resistance, and the inlay must depend entirely upon the cement for its retention.

The cavity preparation for the reception of an inlay calls for the same care that the preparation of a cavity for a gold filling demands. The preparation is very largely the same in the large majority of cavities. In fact, the writer, to demonstrate that, has upon several occasions made a cavity in the approximo-occlusal surface of a molar, and after allowing the inspection of the cavity has made a wax model, withdrawn it, and allowed the operators present to inspect the cavity and model, and then, without again touching the cavity preparation, has made a gold filling in the same cavity. This was done to demonstrate the fact that the principles of cavity preparation were the same, whether a filling of any kind or an inlay was to be placed in the finished cavity.

The four classical fundamentals of scientific cavity preparation must be observed for an inlay as well as for a filling. They are (1) the outline form,

(2) the resistance form, (3) the retentive form, and (4) the convenience form.

THE OUTLINE FORM OF CAVITY PREPARATION.

The outline form comprehends the obtaining of extension for prevention, and the esthetic form.

A good many operators seem to think that the inlay has abrogated the necessity for extension for prevention, feeling that the cement is going to be omnipotent in the prevention of a recurrence of caries no matter what the cavity preparation may be, and it is to combat this impression that I wish to emphasize the necessity for a careful extension of all of the cavity margins well into the areas of relative immunity to caries. That means that all of the margins of the cavity are to be so placed that they will be kept clean by the excursions of food in mastication, or are placed gingivally under the gum margins. All of the fissures are to be cut to their full extent, and the margins of the cavity laid in smooth territory. The bucco-gingival and linguo-gingival angles are to be carried out of the embrasures sufficiently far to be in territory that is kept clean. I wish to emphasize these points, for the reason that I have seen so many inlays that have been inserted in teeth in which all of the laws of extension have been violated, and a failure has been the result. The error most frequently made is the shaping of the cavity in such a way that the gingival angles are considerably within the embrasures, and a consequent susceptibility to caries is found at the bucco- and linguo-gingival angles. The reason why this error is made so frequently is that many operators think it necessary to have flaring cavity walls in order to have the model draw, and the inlay go to place. All of

Fig. 1.

Improper cavity preparation.

this is fallacy, for the best cavity preparation for an inlay, as well as for a fill-

Fig. 2.

Preparation used by author.

ing, consists in flat seats and parallel walls. Fig. 1 shows the form of cavity preparation that is to be avoided. Here we have the flat seats, but the walls are very divergent, and, as will be seen, cause the gingival angles to be thrown within the embrasures so far as to seriously endanger their permanence. In the next model (Fig. 2) we have the cavity preparation advised and used by the writer. It is seen that the seats are flat and the walls are as nearly parallel as it is possible to make them. The cavo-surface angle is beveled all around. In order to show that a model made in such a cavity will

draw without distortion, I will show the picture of the model made from this cavity (Fig. 4), and also the model made

Fig. 3.

Inlay to fit cavity in Fig. 1.

from the first cavity (Fig. 3). A comparison of these will make my meaning

Fig. 4.

Inlay to fit cavity in Fig. 2.

clearer. Another error made very frequently in the preparation of cavities of

Fig. 5.

A frequent error in preparation.

this class is shown in Fig. 5. This cavity in the approximal surface of a molar—it might as well be a bicuspid—is cut into from the occlusal surface, but no step is made, and the cavity is not extended into the central pit. As will be seen, the cavity is made with grooves extending from the occlusal surface toward the gingival seat, and the retention is dependent upon these grooves. The seat in the gingival region is curved instead of being made flat, and the whole cavity preparation is a decidedly weak one, yet it is one that is very frequently met with. In Fig. 6 is shown the model which was made from this cavity, and it shows the weak points even better than the cavity itself.

THE RESISTANCE FORM OF CAVITY PREPARATION.

The resistance form is that which should be given to a cavity that will resist the forces which will tend to drive the inlay or filling out of the cavity. The very best form that we can give a cavity in order that the inlay may best resist the forces brought to bear upon it is the one that we have been taught to make for our gold fillings, namely, flat seats and parallel walls. We all know that a flat foundation is the most stable one and will best resist any force that

Fig. 6.

Inlay to fit cavity in Fig. 5.

tends to displace anything that is built upon it, and those of us who have been using the parallel walls in connection with the flat seats in gold fillings know the value of such preparation in the filling of teeth with gold. I have demon-

strated the fact that this preparation is just as valuable for an inlay, and in my judgment is the ideal preparation for the inlay as well as for the filling. I believe that in following this preparation we shall make successful inlays, and in proportion to the amount of our departure from these principles shall we have failures in our inlay work. I heard one dentist say that the advent of the inlay had emancipated the profession from the bugbear of cavity preparation, and that statement and the inlays that I have seen have evidently been made in harmony with such a philosophy as has aroused me to emphasize the importance of a careful study of scientific cavity preparation. We know that dentin is a very elastic substance, and that a gold filling thoroughly malleted into this elastic medium will cause the dentin to hug the filling so tightly that it will be impossible to displace it by any ordinary means. In a cavity prepared in this manner, we will insert an inlay that according to micrometric measurement fits this cavity exactly. We know by the experiments of Dr. Poundstone that it is impossible to compress cement to a layer thinner than 1/1000 of an inch, and yet we force the inlay into a cavity that is lined all around with cement. What happens? The same as when we mallet a gold filling into such a cavity under heavy mallet pressure. The elastic dentin yields under the stress, and then, by reason of its elasticity, hugs the inlay and cement so strongly that it is almost a physical impossibility to dislodge it. But if the cavity is prepared in such a way that it has flaring walls, as illustrated in Fig. 1, the very force that is holding the square inlay in the cavity is tending to squeeze the cone-shaped inlay out of the cavity, at least so far that the elasticity of the dentin is satisfied. So the resistance form should be one of flat seats and parallel walls.

Fig. 7. Fig. 8. Fig. 9.

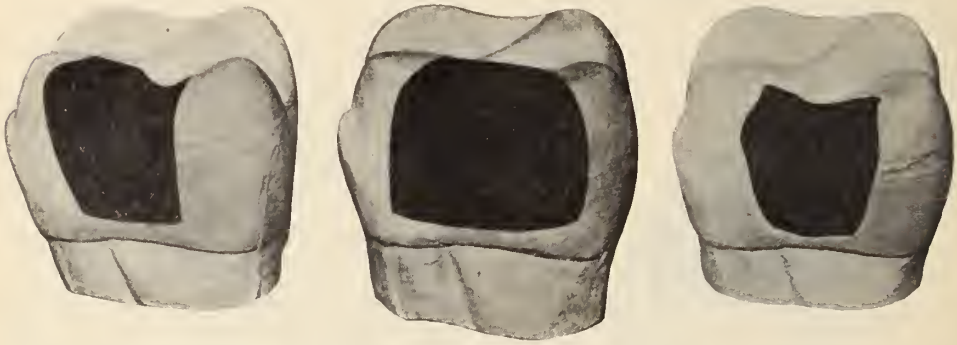


Fig. 7: Inlay cemented to place in cavity in Fig. 1. Comparison with Fig. 8 will show difference in extension of angles.

Fig. 8: Inlay cemented to place in cavity in Fig. 2.

Fig. 9: Inlay cemented to place in cavity in Fig. 5, showing weak points in angle preparation and occlusal retention.

The resistance form also comprehends the dimension of depth. This dimension must be determined by a study of the conditions that are to be met with in the finished filling. A filling or an inlay with great depth will resist the forces

that tend to dislodge the inlay better than a shallow one, but if the conditions do not call for great resistance, it would be very bad practice to cut a deep cavity when a more shallow one would answer the purpose. I do not believe that we are ever justified in cutting away any more of the healthy tooth than is consistent with the preservation of the entire tooth. If we are ever justified in sacrificing healthy tooth substance, it is because the whole of the tooth may be saved by the sacrifice of a part. In order to judge the amount of stress that the finished inlay is to resist, we must know the occlusion, the strength of the power of mastication, and any abnormalities of occlusion. This knowledge can only come to us by a careful study of the case before we commence our operation.

THE RETENTIVE FORM OF CAVITY PREPARATION.

The retentive form for the inlay is very largely comprehended in the resistance form, for we cannot make a cavity with undercuts of any kind for an inlay. The resistance form is intended for shaping the cavity so that it will resist the forces that tend to drive the filling out of the cavity or to so displace it that its usefulness as a tooth preservative is lost. The retentive form is given to a cavity in order to resist the forces that pull the filling out of the cavity. The thrusts are resisted by the flat seats, and the pulls are resisted by parallel walls, so that the advantages of both the resistance and the retentive form are obtained when the cavity is made with flat seats and parallel walls. Such preparation, in the large majority of cases, also satisfies the convenience form as well.

THE CONVENIENCE FORM OF CAVITY PREPARATION.

The convenience form is that form given to a cavity that will tend to render possible the perfect filling of the cavity; for, no matter how perfect the cavity formation may be, if the filling is not perfectly placed the whole is a failure. It is therefore wise to so shape the cavity that it can be perfectly filled, even if in so doing a considerable part of good tooth structure is sacrificed. This is necessary when for any reason any part of the cavity is not sufficiently accessible to allow the formation of a good model or the placing of the inlay after it is completed.

PREPARATION OF THE CAVO-SURFACE ANGLE AND MARGINS.

The preparation of the cavo-surface angle is a most important part of the cavity preparation, and really belongs to the outline form, but as it is the last step preparatory to the obtaining of a model, I purposely left it to be considered last. The most vulnerable part of a filling is the margin, and if for any reason this portion of the filling is not perfect, the whole filling will fail in the course of time. The strong point of a gold filling is the possibility of obtaining very strong and perfectly adapted margins. This possibility also exists in the gold inlay and if the marginal preparation is correct and the adaptation good, a perfect margin is assured. We know that the enamel rods need protection when their continuity has once been broken. We know that the rods generally bear in certain directions to the dentin in different parts of the tooth; for instance, they generally stand on end at

right angles to the dentin and in a measure follow the curves of the latter. But this is not always true, and our knowledge of the relation of the enamel rods to the dentin in one tooth will not assure us of a perfect knowledge of their direction in all teeth. It will be necessary for us to supplement our knowledge of general conditions by a careful observation of the behavior of the rods under the chisel in the tooth under treatment, and then so lay out our cavo-surface angle that it will be in harmony with the facts deduced by that observation. The enamel should be beveled all around the margin of the cavity, and the bevel should be a very generous one, in order that the finished inlay may have sufficient gold at the marginal bevel to resist the forces that may be brought to bear upon it, for we know that gold will flow under stress if there is not sufficient body of the metal to resist the forces of occlusion and mastication. While this is true of malleted gold, it is even more so of cast gold; for gold is in its softest form when cast, by reason of the fact that it is perfectly annealed in the melting process, and regains its hard character only by malleting and beating. Therefore it is all the more important to have a plentiful body of gold in the inlay in all places that in any degree have to resist the forces that may be brought to bear upon it. This is particularly true in all occlusal and incisal margins, but while no force is brought to bear directly upon the gingival margin, it is very important to have a good bevel here also.

THE "BUTT" JOINT CONTRA-INDICATED.

In my practice I have had occasion to make over more fillings that had failed owing to a faulty preparation of the gingival than of any other margin. In no case would I advise the "butt" joint in this situation, for we shall notice from a study of the enamel rods at this portion of the tooth that the rods incline rootwise, and, if a "butt" joint were made, the short enamel rods would be very numerous indeed, and would in a short time fall out and cause a fault that would ruin the inlay. I do not believe in the "butt" joint in any situation, if it can be avoided, as it is almost sure to leave a space between the tooth and the finished inlay. Time and space forbid a general discussion of the entire subject, and I simply show some illustrations that in a degree are self-explanatory.

MAKING THE WAX MODEL.

After the cavity is prepared, the making of a perfect model is of prime importance. In order to do this perfectly, a good wax is a necessity. The wax that Dr. Taggart gave to the profession was the best that has ever been produced, but unfortunately is not obtainable now. I hope that the time is not far distant when Dr. Taggart will come into his own, and we shall again have the benefit of his genius in the production of the accessories for perfect inlay work. A wax that will maintain its hardness at body temperature is essential to success, for the slightest distortion of the model in withdrawing is fatal to success. The wax must be warm enough to be perfectly adaptable to all of the surfaces of the cavity, and should be carefully examined after withdrawal to see that there is no portion where it failed to adapt itself perfectly to the tooth. This can be determined by examining the model with a magnifying glass, and if there is any place of imperfect adapta-

tion, it will manifest itself in the smooth appearance of the wax at that particular place. The wax should be carved to form, of course, and the anatomical form of the tooth be reproduced as closely as possible.

Particular attention should be devoted to the restoration of the contour, so that the full mesio-distal diameter of the tooth may be restored; for no matter how perfectly a tooth may be filled, if the contour is not restored, and thereby the interproximal space is destroyed, the filling or inlay is a failure. There is nothing more distressing to a patient than to have places between his teeth that are food-catchers by reason of the fact that the interproximal space has not been properly restored. This fault is far too common in the filling of teeth and is most reprehensible, but there is no excuse for it in the making of an inlay, for in this method the contouring of the tooth, the making of the contact point, and the reproduction of the entire mesio-distal diameter of the tooth is so easy that the merest tyro should be able to do it properly.

CONCLUSION.

In conclusion, let me say that the enthusiasm that I have for the gold foil filling has not diminished in any degree since the advent of the inlay. I still believe in and use the foil, but the more I study the Taggart gold inlay, the more I believe in it and the more I use it. For if properly used—and I speak advisedly—it is one of the grandest blessings that has ever been bestowed on the dental profession. If used improperly, in a shiftless, lazy, get-your-money-quickly-and-easily manner, it will prove a boomerang to the operator who thus abuses it. The gold inlay has proved its efficiency, and it is to be deplored that some of the great operators of the past are so blind to their own, their patients', and the profession's good that they are sulking in their tents instead of doing what they can to eliminate that which may be evil in the inlay, and promoting that which is good. This is my position. I see incalculable benefits accruing to the profession and the public as a result of the perfection of the gold inlay, and on the other hand I plainly see a large crop of disastrous failures from an improper use of a splendid contrivance, and if I may in any way assist in developing the excellent properties and eliminating the possible imperfections of the gold inlay and its uses, I shall feel highly gratified.

Discussion.

Dr. Don M. Gallie, Chicago, Ill. I know that everyone present regrets that Dr. Taggart of Chicago is not here to open this discussion, and no one regrets it more than I, because it would have been to our great satisfaction to have had this paper discussed by the man who has made the splendid and efficient restorations of today possible.

First of all, I wish to compliment the essayist upon this most admirable paper. Strange as it may seem, though the inlay represents a somewhat new idea in dentistry, the fad for it is lasting a little longer than some other fads that have been exploited and taken up by the profession quite generally, only to die out after a while. Those of you who are in the habit of attending the National or any dental meetings have noticed that in the past few years different waves have taken us off of our feet, and as each year rolled

around, some new wave has come up and the old one has receded.

I am glad that Dr. Conzett writes about the gold inlay from the standpoint of a gold-filling enthusiast.

Like Dr. Conzett, I am a great believer in the gold filling. We have done most wonderful work with that material, and will continue to do so, but I realize that there is a place for the gold inlay; that it has come to stay, and that the operator who is not giving it his attention and using it in his practice is not rendering the best service to his patients which they are entitled to receive.

In the beginning of his paper the essayist spoke of the cavities in which inlays are indicated or contra-indicated. He spoke of those anterior fillings where an excessive cutting and sacrifice of tooth structure would be necessary to make a cavity from which a model could be withdrawn. I do not believe that any member of the National Association or of any progressive dental society would think seriously of putting a gold inlay in such a cavity, because we have another filling material for such cavities which is fitted in every way to make a restoration that is substantial and esthetic, namely, porcelain. To make a good porcelain restoration it is necessary for the operator to cut as much, and in some cases to extend the preparation even farther than for the gold inlay, but none of us would seriously consider inserting gold inlays in the anterior teeth, except perhaps in some cavities in canines, when the caries extends to the lingual surface, or very far under the gum margin, so that the adjustment of the rubber dam and the insertion of foil would be difficult. In a few exceptional cases, then, I find that a restoration by the gold inlay process is very acceptable and advisable.

I was pleased that the essayist made special mention of those complex cavities in bicuspids and molars that extend gingivo-lingually and gingivo-buccally to such an extent that they are much wider between these angles than at the approximo-occlusal angle. In such cavities I much prefer to use foil, for, as you could see by the cavity portrayed in the last illustration, it would be impossible to withdraw a wax model occlusally from such a cavity. It is claimed by some operators that the wax model can be removed by a lateral displacement, but to do so we must have exceptionally wide separation, which is not always obtainable, and I therefore prefer to use foil in this class of cavities, believing that I can make a better restoration at a smaller sacrifice of tooth structure.

The merit of the gold inlay over other methods is that it has brought us to a realization that the theory of extension for prevention has gone beyond the theoretical stage, and is a necessary procedure for meeting the conditions presented.

The essayist speaks of the need of extending the margins buccally, lingually, and gingivally, also of the embrasure. From my observation and clinical experience I am afraid that many practitioners, who are in a measure thorough, painstaking, careful, and skilful operators, do not have a correct conception of the embrasure. The embrasure is the point at which the tooth curves from the approximal to the buccal and lingual surfaces. Conditions differ in different teeth. The embrasures found in a denture with long and bell-shaped crowns require different treatment from those of the short thick type, with broad top and a greater unclean surface area. Here greater extension of the margins is required than in

teeth with bell-shaped crowns and small necks.

I was disappointed that the essayist did not lay more stress upon the occlusal portion of this cavity. Caries occurs upon the approximal surfaces of the teeth, because these are unclean areas, and we need to carry the margin to an area of practical immunity, bringing the margin of the cavity to a surface where it can be kept clean. The tooth structure upon such a surface is naturally perfect. The problem is a different one in occlusal cavities. Here the cavity does not lie in an area of uncleanliness, but in one of structural defects, and we must realize the necessity of carrying these cavities to the end of the occlusal defects, just as we carry them to the extreme point buccally, lingually, and gingivally. A great many operators, while paying close attention to the approximal portion of cavities, neglect in a great measure the occlusal portion. In my opinion we should lay great stress upon this part of the operation.

The essayist spoke also of the different forms of cavity preparation, the outline, the resistance, the retentive, and the convenience forms, and we must realize the importance of the different steps in cavity preparation. The most important of all these is the resistance form. We must so slope our cavity that it resists stress from all directions, and this can only be accomplished by the broad seat of which the essayist spoke, the parallel walls, and the proper shaping of the step at a right angle to the axial wall. That, in my opinion, is one of the most important features in cavity preparation, and too many of us are content to make the occlusal step shallow and narrow, so that it will not resist stress sufficiently, the result being that in time a displacement or loosening of the filling occurs.

The essayist also laid some stress on the mistake made in placing too much dependence upon cement. I am afraid that few operators realize that the cement is the weakest part of the operation. Two or three years ago I read a paper before our state society on the "Gold Filling *vs.* the Gold Inlay," and in order to obtain some idea of how various operators manipulate cements in connection with the inlay, I sent around to about one hundred dentists in the city of Chicago for samples of mixed cement, requesting them to mix that sample in the manner in which they would mix it for setting inlays in their everyday practice, and not to take any particular pains except such as every careful operator would take in mixing; also to indicate the time in which the sample was mixed, and particulars. I made at least fifty experiments myself in the same way; and it was a matter of great wonder to me how many different results were obtained by various operators using various cements. Some samples furnished by the best and most enthusiastic inlay workers, together with the data requested, showed that the time required for crystallizing varied all the way from two to twenty-four hours, and some of the samples were still imperfectly crystallized at the end of six days, and not to be depended upon for maintaining a filling in place. I therefore came to the conclusion that the weakest point in the inlay is the cementation. In my opinion we cannot place full confidence in this operation until in some way we can overcome the weakness of the cement, and have someone produce a cement that can be relied upon.

Dr. Conzett's theory about the expansion of the dentin under the pressure

necessary to force an inlay to place or to insert a filling is not entirely new to me, yet I doubt if there is sufficient elasticity in the dentin to materially affect the retention of the inlay.

Of all the many good points mentioned in this paper, none impressed me so satisfactorily as the beveling of the margin. When the cast gold inlay was first presented to us, all its advocates from the Atlantic to the Pacific had the idea that it was a great success, and that there would be no failures; and they believed that all that was required was to make the margins sharp, and to carve the wax flush with the tooth surface. It did not take very long to find out after the casting of such models that there was some contraction, and that the finishing and polishing of such inlays reduced the gold surface below the tooth surface, and consequently a resting-place for the propagation of bacteria was formed, and caries recurred.

If a margin should be beveled in a gold filling, it certainly should be beveled in an inlay, in order to furnish protection for the enamel rods, and more especially for the cement. The beveled portion of the inlay must be well burnished over the margin, and the cement thus prevented from gradually dissolving.

The essayist touched upon the preparation of the model and the manipulation of the wax. I think we should use the best that the market can supply. Many of our failures in inlay work are due to the fact that not sufficient care is taken in putting the wax in the cavity, and even with proper care at times a shifting of the wax occurs. If in a complex cavity the wax is inserted, forcing it up against the adjoining tooth, the patient can close the jaws, producing occlusion and forcing the wax into the cavity. The wax model cannot be trimmed properly unless it is removed, so that the approximal contour can be finished. In doing that the fine margins are jeopardized. Then the model is placed back in the cavity, and in doing so the wax is liable to be forced in the direction of the least resistance, *i.e.* away from the axial wall. If the operator then takes the burnisher and apparently smoothes over the margins, he may be deceiving himself into the belief that the wax is in absolute contact with and perfectly adapted to all portions of the cavity, while in reality it is merely touching upon the margin, instead of touching the axial wall. In this procedure I have found a great aid in the matrix. If a matrix is applied, we know something about the occlusion. In the average inlay in approximo-occlusal cavities of molars carving does not amount to very much. Usually an inlay looks about the same as a gold filling. We show there the marginal ridge and a smooth surface upon the occlusion. The matrix does not interfere with the carving. I therefore adjust a matrix on the tooth, then place the wax in it as soft as I can manipulate it without it becoming greasy, and force it into the cavity. There is no forcing-out of the wax in the direction of the least resistance, the wax going not only into the cavity, but slightly beyond the margin. If one wants to be sure as to the occlusion, the matrix can be removed, and the patient may lightly close the jaws, as is done in inserting an amalgam filling. When finished I remove the wax model, which has a perfect contour, absolute contact, the proper mesio-occlusal diameter, and a fine, smooth surface. It can then be invested, or, if preferred, the inside of the model can be painted, and the investment will show through the thin film of wax that

is crowded in between the matrix and the tooth surface. With a sharp knife I shave that off, leaving a sufficient bevel, which is wanted for procuring a beveled margin. In this way I find the matrix to be a great aid in the most difficult approximo-occlusal cavity. I can procure a wax model for such a cavity in less than two minutes, which is something to be considered from the standpoint of time-saving to the operator and patient. The model procured I know to be in contact with every portion of the surface of the cavity. Since adopting this method I have had very few inlays to make over. I have some failures yet, it is true, possibly when I have neglected some detail.

We hear so many advocates of the inlay say that it is so much easier for the operator and the patient. The easy road to anything is always a dangerous one. The inlay enthusiasts tell us that we can prepare the cavity and complete the operation from start to finish without adjusting the rubber dam. For my part, I prefer to have the rubber dam adjusted in approximal cavities extending to the gingivo-buccal and lingual surfaces, as shown by Dr. Conzett. If prepared under moisture the cavity cannot be protected. The dentin is infected, and if the cavity is not kept perfectly dry we are sometimes unable to accurately distinguish infected tooth structure. In most cases, therefore, I prefer to have the rubber dam adjusted so that I can remove every trace of infected or affected dentin.

I have made inquiry of a great many of the cement manufacturers regarding the efficiency of the so-called hydraulic cement. They say that it is all right, if properly manipulated, but you cannot slap cement into a cavity and then force an inlay into it with the floodgates open for the entrance of saliva. Saliva does not aid the crystallization, but retards it. But if the tooth is kept dry for a certain length of time, the admission of saliva to the cement will assist crystallization. The preparation of inlays in a haphazard manner will invariably result in failure.

Dr. Conzett said nothing about the procedure to be followed and the care to be taken in casting inlays. We know it is necessary to have a proper cavity preparation in order to secure a good inlay, and a proper model to fit the cavity, but it is also necessary to follow the same careful method with a cast model as with the wax. Yet how many operators simply experiment? Frequently the gold inlay does not come out with the exact dimensions of the model; it contracts or changes form in some way. Dr. Marcus Ward, less than a year ago, carried on exhaustive experiments along this line, demonstrating that the selection of the gold for casting is one of the most important features of this work. He showed that gold which is used over and over again, as has been the practice of many operators, loses its fluidity and cannot be melted at the same degree of heat as fresh gold. He also pointed out the great danger of using scrap gold for this kind of restoration, conclusively demonstrating that inlays made of scrap gold or low-karat gold cannot be depended upon on account of the change in the form of the gold, which causes imperfect margins and distortion.

This whole question resolves itself into a mere proposition of good common sense. In the insertion of a gold foil or an amalgam filling or in the preparation of a crown, we simply come down to a proper realization of the limitations of

all dental operations. The inlay in one mouth may be indicated, yet in another, even in the same kind of cavity, it may be entirely contra-indicated. The same may be said of gold foil, of porcelain, or any of the different filling materials. If we intelligently realize all these limitations, then it is merely a question of exercising judgment in adopting the proper method in the restoration of lost tooth structure whenever required.

Dr. J. F. Wallace, Canton, Mo. It has been a source of great pleasure to me to listen to this able paper of Dr. Conzett, and I am convinced that all of you have been interested and instructed as well. Dr. Conzett has given me a great deal of inspiration by his gold foil work. The great satisfaction that I have derived from the fillings which he has made for me has created in me a desire to be able to use that material in all cases indicated, and in my opinion, gold foil is the filling material *par excellence.*

I am not willing yet to discard my pluggers, as others have done, and to resort to the gold inlay exclusively, but prefer the gold filling in a large number of cases, because better service can be rendered to patients by the insertion of a good gold filling than is possible with the use of an inlay.

Dr. Conzett remarks that it is not possible for all men to become expert gold operators, yet I believe that a great many more dentists could become good operators if they would only take the time, exercise patience, and be systematic in all the details of the operation.

I fear that the dental profession as a class cannot be characterized as systematic in their methods. If our great business enterprises throughout this country were conducted with the same lack of system which is characteristic of most dentists in making a gold filling, there would be many more failures in undertakings which today are marked with success. How many operators pay that close attention to cavity preparation in every detail, step by step, that Dr. Black has taught? If these details are neglected, failure will follow, or the operation will at least fall far short of the highest standard.

It is most important for us dentists to learn how to study the conditions present in the teeth and mouth which we are treating. There are no two cases in which the conditions are the same, and the careful and successful operator must in every case determine what is necessary—a gold filling, or a gold inlay, or an amalgam or porcelain inlay—before proceeding with the operation. The condition present in the individual mouth should be the exclusive guide in all our operations.

No operation is stronger than its weakest point, both in regard to cavity preparation, if the cement margins around the inlay are left exposed, and in regard to extension, and the accuracy with which the preparation is made for the securing of the filling. If that weakest point is recognized, the greatest effort should be made to render that vulnerable point as secure and as perfect as possible, for otherwise it will be a source of failure, and all efforts to preserve the tooth will be of no avail.

It has been rather interesting to me to notice, as the years have gone by, that so many operators who in the past ridiculed the idea of extension of the cavity margins and carrying them into areas of immunity, are now so generally advocating the employment of the gold inlay and the sacrificing of a greater amount

of tooth structure than they were willing to concede in order to secure a good gold filling. They are now even sacrificing tooth structure beyond the areas necessary for the prevention of recurrence of caries, for they sacrifice dentin in the occlusal portion of teeth for the purpose of withdrawing the model, as shown by Dr. Conzett, although this area is not susceptible to caries. I believe, however, that on the whole a better cavity preparation is employed for the insertion of gold inlays than has been used in the past for gold fillings, and if the introduction of the inlay does no more than bring about a realization of the necessity for the extension of cavities at the margins in order to bring them into areas of immunity, its value will be a no mean one.

The conditions of susceptibility to recurrence of caries are the same in inlays as in gold foil fillings. If the embrasure or interproximal space is to be protected in a gold foil filling, the same holds good for a gold inlay, and that particular point should not be neglected under any circumstances.

Dr. Conzett speaks of the necessity of making a proper point of contact, for the omission of which there is no excuse. It is quite as easy to secure that contact point in a gold filling as it is in an inlay. Much of the patient's comfort and the preservation of the health of the surrounding tissues depends upon a proper contact point, and it is a source of great regret to have a patient come back complaining of the wedging of food in the interproximal space and the resultant wasting away and destruction of the gum tissue.

Dr. Gallie has laid some stress upon the use of the rubber dam, and I think his remarks were very timely. No one is more justified in preparing a cavity for an inlay without the protection of the rubber dam than he is for the insertion of a gold foil filling. No operator can absolutely tell whether a cavity has been properly prepared, if it is moist. If he is able to do so, he possesses an excellency of eyesight not given to most of us. The practice of many operators of setting inlays without adjusting the rubber dam is to be condemned. The fact that we have cements which are said to be capable of setting in the presence of moisture is no reason why they should be floated in a medium of bacterial cultures, which of itself should be sufficient to impress the necessity of securing absolute freedom from moisture, even though the so-called hydraulic cement might crystallize properly. Since bacteria are present in the saliva, it is only a question of time when caries will recur on account of bacteria having been sealed into the cavity with the cement.

It is a matter of regret that the profession should be going after every innovation like a herd of sheep following the bellwether. As soon as an operator brings out some new operation, we all run after him, instead of waiting to have the innovation tried out. The dental profession is too prone to look for something easy, rather than to test and learn to use new materials and to perform such operations as have already stood the test. If we were as enthusiastic in learning to use the old and tried materials and to select the best ones for our operations as we are in getting acquainted with the new things that are presented to us, we would no doubt serve the public a great deal better.

I do not wish to convey the idea that I am altogether opposed to the inlay, because I believe that there is indeed a

large field for its use. It is decidedly indicated in very many places. Nervous patients, whom it is almost impossible to control a sufficiently long time to make a first-class gold foil operation, can be better served by using the gold inlay. That class of cavities mentioned by the essayist, which would require a sacrifice of the occlusal surfaces and restoration by a crown, might very often be cared for by the use of the inlay, also inaccessible cavities, in which it is not possible for us to reach every portion of the cavity for proper condensation of a gold foil filling. In such cases I would prefer the inlay. In young patients whose teeth are not sufficiently developed, and in whom, because of the undeveloped condition of the roots, there is danger of injuring the pericemental membrane by malleting and properly condensing a gold foil filling, rather than to take the chance of doing permanent injury I would use the inlay. Patients who, because of constitutional weakness, are unable to undergo the long and tedious operation of a gold filling, and those in whom a plastic filling material would not be satisfactory, should also receive a gold inlay.

After all, as Dr. Gallie has said, it is a question of studying conditions and realizing when it is best to use this or some other material. I would therefore advocate a method of intelligent selection rather than make the inlay a paramount consideration, universally using it whether indicated or not.

Dr. R. Ottolengui, New York. In the discussion of this question of the inlay, I want to set up an entirely different system of deciding whether to use gold inlays or gold foil fillings. It seems to me that deciding in favor of the gold foil filling if the cavity is accessible, and choosing the gold inlay if the cavity is inaccessible, implies an injustice to cases in which the cavity is inaccessible. The operator cannot make such a discrimination unless he feels certain that his gold fillings are better than his gold inlays.

In my opinion the salvation of the tooth by any filling material should bear no relation to the accessibility of the cavity, or to the ease or difficulty with which one or the other operation can be made. If the gold inlay is admittedly good enough to save one tooth in a mouth, it is good enough to save any tooth, aside from cosmetic considerations which may prompt one to prefer porcelain to a display of gold.

I would therefore make a discrimination of this character: I would use the gold inlay in any cavity in which the insertion of a gold filling would necessitate more than half an hour of time. You may ask, "Why that discrimination?" For the reason that I believe teeth can be successfully saved by either method, and that if a filling can be placed in one-half hour in one sitting, it is an injustice to the patient to compel him to come back for the insertion of a gold inlay. But if it would require more than half an hour to put in a properly condensed gold filling, the convenience as well as the needs of the patient are better complied with by the insertion of a gold inlay.

I wish also to say a word regarding the correction of the contact point. It is quite true that a perfect contact point can be made with a gold foil filling; but it can be made better, much more certain, and with much less distress to the patient, with the gold inlay. For you cannot expect to make a perfect contact point in a gold foil filling without first separating the teeth, and the polishing

away of the rough parts and the trimming of the filling to the contour which we desire to maintain is always a question of guesswork. By long experience *we learn to guess accurately,* yet sometimes we make a mistake, and then the contact point is not restored when the contiguous teeth return to position. We may have the misfortune, in polishing a gold filling, to find a deficiency that must either be left or be burnished out, and if it is left, the filling is defective. That is not true with the gold inlay. It is easy to make a perfect contact point, because you can over-contour the wax pattern, allowing for the removal of an amount of gold in the polishing process, and if you should make the mistake of cutting too much when polishing the inlay, the contact point may be restored by solder. It is a question in my mind whether it is not really better to make the contact point with solder, because this is a harder metal and will receive a higher polish; the making of a contact point of gold against a contact point of enamel requires that the metal should be highly polished.

Just one word in reply to Dr. Gallie. He pointed out a difficulty in the use of gold inlays in occlusal cavities where the gingival margin is wider than the occlusal opening. Dr. Gallie started out by saying that he regretted that Dr. Taggart was not here to open the discussion, but Dr. Gallie was present when Dr. Taggart answered this identical question. At the January meeting of the Odontographic Society, this kind of cavity was declared to be a place where the inlay is not serviceable. Dr. Taggart was called upon to reply, and his answer was this: That while it is rarely necessary that such a cavity be left with a narrow occlusal opening, still if one desires to so leave it, the approximal surface can be inlaid first, and a groove can be cut through the approximal inlay and a second interlocking inlay be placed in the cavity. That is a great deal better for the patient than to select one of the most difficult cavities and compel a patient to sit for hours, when in this progressive age it is absolutely unnecessary to have a patient remain in the chair longer than thirty minutes for filling a tooth.

Dr. Gallie. I remember the discussion in Chicago mentioned by Dr. Ottolengui. Dr. Taggart spoke of this kind of cavity and the restoration by a double inlay, one inlay for the gingival two-thirds and the other for the occlusal third. I am sure that but a small portion of the audience believed that such a procedure was practicable, and I challenge Dr. Ottolengui or anyone else to treat these cases successfully by such means. There may be an isolated case where it can be done. The distance from the axial wall to the adjoining tooth is so great that it would be most difficult to secure sufficient separation to remove the wax model.

Dr. M. L. Rhein, New York. It has been an exceedingly great pleasure for me to listen to the paper of Dr. Conzett and to the discussions which have followed. I have been rather disappointed by the discussion of Dr. Ottolengui on this subject. I believe that the first three speakers have best represented the general consensus of opinion on this question. We are not in a position to indorse the statement that thirty minutes should be the limit of an operation for the permanent restoration of any tooth.

The question regarding the cavity which Dr. Ottolengui spoke of has never been answered by Dr. Taggart. I must

say that I agree with the position taken by Dr. Gallie. It is inconceivable to me how the wax can be withdrawn from cavities which extend to some depth, at least at the pulpal portion and down toward the root of the tooth.

The method that I have found valuable in such cases, when an inlay is to be made the main portion of the work, is to introduce a filling first. If the cavity extends to some distance under the gum, this filling can be made of amalgam. If the rubber dam can be properly placed, I usually insert a gold filling in the lower gingival third if I wish to preserve the upper portion, and restore the occlusal portion of the approximal surface by the insertion of a gold inlay. This seems to me not only more practical and easy, but we are sure of a much more perfect result as far as the gingival portion is concerned.

One portion of Dr. Conzett's paper interested me greatly, namely, that regarding the beveling of the margins, and I would like to dwell a little on that particular point. I believe that this beveling of the entire margin of the cavity, starting at the gingival portion and proceeding up the axial walls, taking in every portion of the occlusal surface, is one of the most important points in cavity preparation, and if I were to attempt to criticize Dr. Conzett's paper, I would simply say that I believe in a more liberal beveling than appears in his illustrations. Frequently in approximal cavities which necessitate a very extensive cutting away of the side walls, the extension necessary for insuring a permanent operation can be readily obtained by an extensive bevel along the axial wall, without any unnecessary cutting into the dentin itself.

I wanted to emphasize this one most admirable point of the paper, viz, that a butted margin is not a method by which a permanent result can be secured.

For the question of selection of either a gold filling or a gold inlay, no rule can be laid down. I believe the speaker who said that this must be left to the mental status of the individual operator has described the situation properly. It depends on the method of different operators. We can establish a general rule for ourselves, but not for other men.

My own method is to invariably fill a cavity of easy access, and in two approximal cavities, I invariably put a filling in the one that is easiest of access, and an inlay in the adjoining one, because it is very simple to make a perfect filling in the former, but not always in the latter.

I believe the tenor of the discussion that we have listened to leads us to believe that while we recognize the great value of the inlay and all that has been claimed for it, yet for a perfect preservation of tooth structure the gold filling still maintains its pre-eminence; that is to say, when it can be inserted under perfect conditions as described by the essayist.

Dr. Ottolengui. I just want to say in reply to Dr. Gallie that there is no such cavity as he described. If he will prepare the cavity properly and produce the amount of space necessary for inserting a proper gold foil filling, I will accept his challenge and make either a single or double gold inlay for it.

In response to Dr. Rhein, who said that he is not ready to accept the statement that thirty minutes should be the time limit of an operation, I would say that he has misconstrued my remarks.

I said that it is unnecessary to keep a patient in the chair longer than half an hour. If you want to take hours for the operation, I am perfectly satisfied you should do so; if the patient is given only one half-hour's sitting, three hours are spent in the laboratory, and another half-hour at the next sitting, the patient will be willing to pay twice the amount of money with twice the pleasure.

Dr. Conzett (closing the discussion). The very best part of the instruction regarding the subject of a paper is in my opinion generally obtained by the discussion; surely that has been so in this case. I want to thank the gentlemen who have discussed the paper for their kind appreciation of my effort.

I did not attempt to go over the whole field of the inlay, as this would be impossible in the time allotted to this subject. I simply touched upon those points which seemed to be important and which seemed to require emphasis, for the benefit of those who may be troubled with any doubts about this subject. I purposely did not touch upon the subject of casting, because that question has been answered by operators better qualified than I, and because Dr. Ward of Detroit and Dr. Baker of Davenport are still working in that field.

Cavity preparation should be given more careful consideration than the majority of the profession are devoting to it. I believe that we appreciate some of the faults of the past, and should therefore resolve to make more thorough cavity preparation for the insertion of inlays in the future.

I could not and would not try to lay down any rule according to which a gold filling must be made in one place and a gold inlay in another—that being a matter of the personal equation. One of my very best professional friends is a most enthusiastic inlay worker, and makes nothing but inlays. He confessed to me that he did not make gold fillings because he was never satisfied with any of his gold fillings. He found out that for him it was a physical impossibility to make a perfect gold filling. Therefore, if an operator cannot make a perfect gold filling, it would be very undesirable if he attempted it, and if he can make a perfect gold inlay instead, it is the best for him to do so. There are very few operators who cannot make good gold fillings if they would attempt to study the fundamental principles underlying them, as they are taught by Dr. Black. I believe that a well-made gold filling is the best thing we can possibly place in a tooth.

I am not going to join in the controversy that has arisen over this paper, but I merely wish to say that I would never make an inlay for a cavity if I were not able to make a satisfactory one.

The next item on the program was a paper by Dr. David Stern, Cincinnati, Ohio, entitled "The Metric System of Weights and Measures," as follows:

The Metric System of Weights and Measures.

By DAVID STERN.

It is almost as important to the dentist to be thoroughly familiar with the metric system as it is for him to understand more than one language. This was brought home practically last summer to those of us who attended the International Dental Congress at Berlin, where papers were read and discussed in German, English, French, and Spanish.

WIDE USE OF THE METRIC SYSTEM.

Where the use of weights and measures was called for, whether in lectures or for other purposes, the metric system was applied by all, except some of the English-speaking people, who are slow in taking it up, but must eventually adapt themselves to the universal system. Why procrastinate, when it can just as well be done now? With the spirit of awakening an immediate interest, I have collected the material for this paper from various sources, in order to demonstrate that it is less difficult to use the multiples of 10 than those of 2, 4, 8, etc. While troy weights and measures are still used in prescription writing by most dentists and physicians, nobody would today think of teaching chemistry or physics by any other system than the metric, and I do not know of any textbook in which any other is used.

THE ORIGIN OF WEIGHTS AND MEASURES.

Weights and measures have been in use since the earliest days of the human race, but were of an elementary nature, owing to the undeveloped mind of primitive man, long before the use of numbers. Weight may have had a grain of corn as a unit; length the palm of a hand; distance a day's journey as judged by the length of a pace. However, there was no standard by which all weights and measures could be gaged as can be done today.

It is natural that primitive man should have used as units of measures parts of his body as the most convenient objects at hand; he would employ the breadth of the first joint of the forefinger, the span of the extended fingers of a hand, the length of the foot or the forearm, the distance of the tips of the fingers between the extended arms, etc., for the standard of lineal measure. The diversity of size in persons prevented the establishment of a fixed unit under this system, and prohibited an equity in exchange between people in proportion to the development of trade, for the proportions of a man of six feet could not be realized by people of all nations. Later on, the size of a leader of a tribe or that of a ruler was adopted as a standard, and this system has strangely persisted to modern times. Up to the reign of Henry I (from 1100 to 1135), it is said that the length of the yard was fixed by the length of the sovereign's arm.

An early unit of value for the basis of exchange was the ox, which later on found an equivalent in a certain amount of gold. The universal distribution and

the uniform scarcity of this element have made it a basis of value up to the present day, other materials varying in value according to their abundance or the cost of bringing them into market, as compared with the stable value of gold. There had to be a method of weighing this gold, whether in the form of strips, wire, or dust, and no doubt seeds of plants were used as weights for a primitive balance. Early weighing for purposes of trade could not be confined to gold, and early Egyptian records show that silver, copper, lapis lazuli, etc., were used in connection with gold.

It lies, however, outside the province of this paper to go into the history of ancient measurements, which would be exceedingly interesting but would require more time to consider than is allotted to the subject under discussion. It is necessary to pass very rapidly over the development of the science of metrology, as well as the history and science of measurements, any one of the many branches of this subject furnishing sufficient material for discussion by a scientific society.

SCOPE OF THE PAPER.

We want to consider briefly and in an elementary way the origin and development of the metric system, its extension throughout Europe and elsewhere—and, for the sake of comparison, the weights and measures in use in the United States; the metric system of today, the system used in commerce, manufacturing, dentistry, medicine, and pharmacy, also referring briefly to the system in connection with electricity. The metric system of the present and the near future naturally interests us most, and it appears to be most practical to give it as much of our limited time as possible. It represents a complete, uniform, and simple international system of weights and measures, and as such may be considered briefly in its entirety, with a view to the relations of the various units to one another.

RELATIONS OF THE VARIOUS UNITS USED.

In the last or "eighth" decennial revision of the Pharmacopeia of the United States, which became official in September 1905, all weights and volumes are expressed in units of the universal system, based upon the meter, and the centigrade thermometer is employed. This is a step in the right direction, and one that has long since been taken up by nearly all foreign countries. England displays less interest than all other European nations; her monetary system is difficult to learn, while we can go into Germany, France, Austria, or Italy and comprehend their systems, which are like that of our own currency.

Why should water boil at 212° in England and at 100° in France, freeze at 32° in this country and at zero in Germany?—formerly it boiled at 80° in Germany. Why should a pound be of the same weight in a drug store and in a grocery, while an ounce has a different weight in these two places? Just because the apothecaries' weights have been used as standards since 1825, and it has not been convenient to learn and teach the universal method? The size of the grain is fixed in the mind, and because the gram is approximately fifteen times as large and heavy, it appears difficult to take it as a standard in prescribing.

SIMPLICITY OF THE DECIMAL SYSTEM.

The metric system, which is founded on a decimal basis, is so simple that

it can be learned from a few pages of a text-book. When once learned it is not necessary to exert the mind in calculating with any other complex system. For instance, I recently purchased a bottle of hydrogen dioxid, on the label of which was printed that each fluid-ounce contained 3/16 grain of acetanilid, which left but a vague impression of the proportion of the acetanilid to the dioxid, and it required considerable figuring to get at the percentage. An ounce has 480 grs. Now, if 480 grs. dioxid contain 3/16 gr. acetanilid, then 160 grs. contain 1/16 gr. acetanilid, and 2560 grs. contain 1 gr. acetanilid; therefore, 1/2560 gr. equals 0.04 per cent. acetanilid.

Would it not be more satisfactory, then, to state that each liter contains four-tenths of a gram of acetanilid?

UNIFORMITY OF CHEMICAL TERMS.

To the student of science an international system is a necessity, for he must be able to understand the literature of various nations. The chemical symbols are today alike everywhere, and H_2O is the formula for water throughout the civilized world. In other words, chemistry has a language of its own. We do not know the real weights of atoms, but as hydrogen is the lightest recognized body, and therefore is taken as unity, the comparative weights of the atoms of the several elements can be ascertained. We have laws of nature which have almost become axioms, such as (1) *The law of Avogadro:* The molecules of all gases occupy equal volumes, or equal volumes of all gases contain equal numbers of molecules. (2) *Vapor density* is one-half of the molecular weight. (3) *The law of Archimedes:* Any object will displace the quantity of liquid exactly equal to its own weight. These are only a few of the numerous laws of nature in which weights and measures are involved, which are understood all over the world, and it is no more than right that the measures coming under these rules should be uniform.

A. W. HOFMANN'S EFFORTS TOWARD THE UNIFORMITY OF STANDARDS.

Great difficulties were encountered in introducing and placing fixed values upon chemical symbols, and it was only as recent as the declining years of Bunsen—1858—that HO was the chemical symbol for water instead of H_2O. The great chemist, A. W. Hofmann, lectured to classes on elementary chemistry in England, France, and Germany, and found much difficulty in presenting his subject to his students, because the lectures on elementary chemistry were written and delivered while he was professor at the Royal College of Chemistry, London—1845—and later it involved much work to put his symbols into terms that would be understood by his French and his German students. It was my good luck to have been one of his students, and frequently, in the laboratory, he pointed out to me the advantages of the metric system, and how it simplified and assisted in the overcoming of many scientific obstacles. I have translated freely a few paragraphs of the lectures which he delivered at the University of Berlin. Hofmann says:

> In investigations of relationships of the volumes and weights in which we saw H uniting with Cl, O with N, H_2O uniting with NH_3, etc., for numerical results we have used H as the relative unit of volume and of weights, without considering the selection of a volume of absolute measure, the weights

of which might have served as a measure of comparison of the different bodies. This selection, which will give our symbols and formulas a significance for absolute value, and therefore enhance practical application, must consequently no longer be postponed, and the question arises which of the numerous weight and measure systems which have come into use is most eminently qualified to be adopted as a standard. . . . The comparisons of investigations made in only two or three countries, like Germany, England, and France, which make use of different systems of weights and measures, require the sacrifice of time and energy, lamentable when they must be made, and more so when they are not made, for, as only too frequently is the case, the experiences of one country remain a sealed book to the investigators of other countries.

Hofmann then goes over the list of advantages and disadvantages of the various systems of different countries and different provinces of the same country, and states that it is absolutely necessary to adopt one system, ending by saying:

In answering this question, regarding which, as cannot be denied, there is a great diversity of opinion, we decide without any hesitation in favor of the French metric system. Its simplicity has assured it recognition by the scientific world, and in various countries it has already become the legal system of measures for everyday life.

This shows how our scientists used the metric system more than half a century ago, and assisted in putting the metric and decimal system on a permanent basis.

THE FRENCH SYSTEM ESTABLISHED IN 1795.

On April 7, 1795, the National Institute of Science and Arts of France made a full and comprehensive report on a new scheme of weights and measures, recommending a new system of nomenclature, and defining the various units of the metric system. As our metric system is based almost entirely on this report, it is perhaps best to quote it here. Article 5 of this report reads as follows:

The new measures will be distinguished by the name of MEASURES OF THE REPUBLIC; their nomenclature is definitely adopted as follows:

Meter. The measure of length equal to the ten-millionth part of a terrestrial meridian contained between the north pole and the equator.

Are. The measure of area for land equal to a square meter on each side.

Stere. The measure designed especially for firewood, and which shall be equal to a meter cube.

Liter. The measure of capacity both for liquid and dry materials, whose extent will be that of a cube of one-tenth of a meter.

Gram. The absolute weight of a volume of pure water equal to a cube of one-hundredth part of a meter, at the temperature of melting ice.

DECIMAL SYSTEM AND TERMS.

Any particular unit, as such, does not possess intrinsic superiority over other units, but by reason of being united into a system which is strictly symmetrical and systematized on one base ratio throughout—that base ratio being 10—metric units have many advantages over those of other systems.

For ordinary purposes and simple measurement, units are grouped into five different classes, those pertaining to length, surface, volume, capacity and weight—weight, exactly speaking, meaning mass. All of these depend upon the fundamental unit, and all must bear a strictly decimal relation to one another. Furthermore, what was once deemed desirable but found impossible of realization, namely, the definition of a stand-

ard of some object or condition in nature, has been accomplished, and today we have the meter precisely defined in terms of the wave length of the element cadmium. Thus, even in case of loss or destruction of the international prototype meter, or of copies thereof, it is possible to reproduce the exact length of a meter by experiments which to the physicist involve no serious difficulty.

With a fundamental unit, the international prototype meter, accurately defined, a system of measures of length sufficient for the needs of science, commerce, and industry, is built up by simply multiplying by tens successively, and by a similar process of decimal subdivision. Each unit is either ten, one hundred, one thousand, or one million times as great as the unit of length, the meter, or a similar fraction or subfraction thereof. For the multiples, the metric system employs prefixes derived from the Greek as follows: *Deca,* meaning 10 times; *hecto,* 100 times; *kilo,* 1000 times; *myria,* 10,000 times. Prefixes derived from the Latin are employed for the submultiples as follows: *Deci,* meaning, 1/10; *centi,* 1/100; *milli,* 1/1000.

The Bureau of Standards of the United States has published a small pamphlet on the international metric system of weights and measures, and also one containing a brief history of the same, which explains this system and its introduction into this country more concisely than I can. These two pamphlets were sent to me by Mr. S. W. Stratton, director of the bureau, at Washington.

THE METRIC SYSTEM A TIME-SAVER IN THE SCHOOLS.

An international language and an international currency—which, however, are not under discussion now—would serve to increase commerce, and the new metric system is destined to bring about the same result. In addition to the advantages in the actual weighing and measuring of everyday life, there would be a great saving of time in the schools, where the complete metric system, taught in connection with decimals, would require but a fraction of the time now given to compound numbers. Authorities on education have estimated that at least one year of a child's school course could be saved by the adoption of the metric system, as after its employment in our practical everyday life the Anglo-Saxon measures would be of little more use than those of the Greeks and Romans would be today.

THE METRIC SYSTEM ADOPTED BY THE INTERNATIONAL POSTAL UNION.

In the International Postal Union it was necessary at the outset (1872 in the United States) to find a common system of weights and measures to regulate the payments and exchanges of mail, and the metric system was adopted and has been employed ever since with complete success, even among nations that otherwise are not using the metric system.

METRIC SYSTEM IN ELECTRIC ENGINEERING.

For the measurement of electrical quantities throughout the world a single system of units is employed, based on the metric system and adopted by scientists and engineers universally. When tenders are asked for electrical machinery, materials, or apparatus, the manufacturers of every nation in the world are on the same footing as regards the

understanding of specifications and the utilizing of materials for a desired output. When Berlin had, at Charlottenburg, the only government testing bureau, it received apparatus and materials from many nations, to be examined and standardized according to a common system.

ADVANTAGES OF THE METRIC SYSTEM IN BUSINESS AND MANUFACTURE.

In foreign commerce many difficulties are overcome by modern metric methods when understood by the interested parties, and it is not necessary to constantly refer to conversion tables in doing business by catalogs, price lists, and samples. The purchaser can tell at a glance what he wants to know about quality, sizes, prices, etc., of the articles under consideration, whereas, when not familiar with foreign systems, he often purchases according to the only system which he understands, to his own disadvantage. With a single system no nation would enjoy any advantage over another except in the actual merit of the goods, and general excellence and prices would cause wider competition, and produce superior results in international business. For a country's export business must be considered, whether that country be on a basis of free trade or protection, and all countries must seek an outlet for their surplus products in foreign fields. James G. Blaine, secretary of State in 1890, urged upon the United States government the adoption of the metric system for customs.

For the small local dealer, or even in the household, it does not appear to make much difference which system is used, and the price of the articles used for measuring is of little consequence. In these cases there is no reason why the universal system should not be introduced, doing away with arbitrary weights and measures having no relation to one another, such as the dry and the liquid quarts for instance. In the United States copper is weighed by one standard, silver by another, medicine by still another, precious stones by a fourth, chemicals by a fifth, and none of these are interchangeable except by fractions. The American dealer imports his platinum at so much per gram and sells it by the pennyweight. I have with me a catalog and price list of teeth made in this country, which gives all the measurements in terms of the metric system. The use of this system is at least a temporary drawback to the sale of these teeth in this country, although they may possess as much merit as those of any other manufacture.

For the dentist, would it not simplify his calculating the cost of producing crowns, bridges, inlays, etc., if he purchased precious metals by the gram instead of the pennyweight?

OBJECTIONS TO THE INTRODUCTION OF THE METRIC SYSTEM VOID.

The strongest argument which the anti-metric people, especially in England, can offer is that the adoption of the metric system would occasion temporary inconvenience or expense, and loss of business and comfort to the people at large. In the United States the majority of people have been educated in the public schools, in most of which the metric system has been taught as a part of the course in arithmetic since 1880, and further, everybody is accustomed to the decimal system as used in currency. We are naturally as intelligent as the

College of Dental and Oral Surgery of New York

continental Europeans, who experienced but little inconvenience and injury at the time when the changes were made. Tables of comparison could be used, and, as the old weights and measures wear out, new ones based on the metric system could be purchased to replace them. That the mechanic can readily learn a new system is shown by the fact that very many of our mechanics worked at their trades in Europe under the metric system, and quickly adapted themselves to the use of our systems, which are more difficult to learn.

In this country we are now eliminating the term *ton* (our ton is 2000 lb., while the English ton, which we call the long ton, is 2240 lb., and the "sanded" ton, for weighing pig iron, is 2266 lb.), using thousands of pounds instead of tons. No difficulty was experienced in changing from the long to the short ton, and there should be just as little in changing to the metric ton. One of the largest chemical works in this country (Solvay Process Co.) buys its coal and supplies by our ordinary weights and measures, and invoices them under the metric system, finding it very economical to do so. Even the British Railway of England employs the kilogram as its unit of weight for all its European business, and the French monetary system for its accounts.

INCONVENIENCES AND HARDSHIPS CAUSED BY DIFFERENT SYSTEMS.

It is difficult to buy by one system and sell by another. Chemicals are imported under metric weights and are disposed of under the avoirdupois or apothecaries' pounds. A British diplomatic official, in speaking of conditions in Belgium, says, "The disputes which were formerly so numerous and which rendered long and complicated calculations necessary have become few and far between. In short, the adoption of the metric system has done much to insure honesty in commercial transactions." *

For many years some of the American manufacturers have had part or all of their goods, such as watches, thermometers, scientific instruments and apparatus, produced in Europe, where the materials used are purchased and the labor employed is paid by the metric system. The import duties also come under this system, but the marking of sizes and prices of sale must be converted into our systems, therefore the adoption of the metric system here would facilitate the traffic in such commodities. Naturally, the adjustment of our machinery for the production of these articles would involve some trouble and expense, which in a comparatively short time, however, would be recouped, if the system were put to use in our home market; for working under various standards would also call for independent plants where these different standards are used.

The greatest actual hardship is experienced in the change of standards of measures in manufacturing plants where expensive machinery and tools are involved; but the European countries went through and survived this experience, and afterward felt repaid for the sacrifices which they had to make by the benefits derived after the changes had been made. We have had similar experiences in this country within the recollection of many of us. Our railroads were built on a broad gage in the South, a standard gage in the North, and a narrow gage where either of these gages was supposed to be too expensive or impracticable to adopt. As the development of the coun-

* "English Parliamentary Accounts, 1900," vol. xc.

try advanced, these methods were detrimental to traffic, and the necessary change to the standard gage was made without hardship to the people, although it was more difficult and expensive than the changing from local to standard time. Consider the difficulty and confusion involved in the employment of gages for wire and sheet metals, and the diversity in size of one of these coming under the same number.* Select any number, and the material made according to any one of the gages referred to is not suitable to be used with that made to another gage; so the natural tendency is to abandon all arbitrary gages and work with one according to the decimal part of the meter, which will present no great inconvenience to the average mechanic. New and expensive dies and taps for the use of wires and rolls for the sheet metals would have to be made, and we should have to go to the same expense and inconvenience as other countries have done in making the changes. Yet metric wire gages were introduced into France in 1894, and have proved satisfactory. A universal system is desirable in the manufacturing of all classes of machinery, from the coarsest screw-thread of the largest lathe down to those of the watch or of microscopic instruments, where the use of micrometers is involved. The Swiss first employed the metric thread for small screws, and since 1869 the American Watch Co. has used it in its watches, and also for all its machinery.

THE METRIC SYSTEM IN MEDICINE, DENTISTRY, AND PHARMACY.

Time does not allow us to dwell longer upon the metric system in regard to trade and manufacture, for we must devote a little time to medicine and pharmacy, of which I spoke briefly at the beginning. Dentistry and medicine are applied sciences like chemistry and physics, and there is no reason why dentists and physicians throughout the world should not be in accord in regard to one system of weights and measures, in order to understand and interchange literature, and to prescribe new remedies uniformly. The modern dentist, no matter how busy he may be, reads in medical journals of the methods of treatment employed in Europe, where the metric measures are exclusively employed, and if he wishes to adopt these new remedies he must make use of the metric system or translate it into the old one, either way requiring a knowledge of the metric system. At present, the colleges all teach according to the metric system, and the only excuse which the practitioner has is that he is accustomed to the old way, and it is not convenient for him to change. Fear of mistakes on the part of pharmacists appears to me to be a weak excuse. Fatal mistakes have been and will continue to be made under all systems, but are less likely to occur under the decimal system than they are to occur through misunderstanding of prescriptions written in apothecaries' weights and measures, with their numerous units, such as pounds, ounces, drams, scruples, grains, minims, etc., and through the ungainly symbols and characters as employed and written by some physicians to represent these units. With apothecaries' weights and measures, it is customary to denote quantities by roman letters, which are more readily confused than the arabic figures in metric prescriptions.

* See Dixon, "Mechanical Art Simplified," page 161.

THE METRIC SYSTEM ADOPTED IN THE UNITED STATES.

It is best to have a uniform system, beginning with the manufacturer and employed in the same manner by the wholesale dealer, the pharmacist, dentist, and physician. It should no longer be necessary, as is the case, for European manufacturers to provide special containers for the drugs which they send to us, as the new system now figures officially in the United States Pharmacopeia and also in the British Pharmacopeia of 1898. Territories now owned or controlled by our country as a result of the Spanish-American war have been using the metric system for years. If this system can be employed in the United States marine hospital service, the medical department of the United States army, and the medical department of the United States navy, there is no excuse for not making use of it exclusively in private practice.

In the United States marine hospital service. It was in the marine hospital service that the innovation was first adopted, according to the order issued on April 27, 1878, which was as follows:

The medical officers of the marine hospital service will hereafter, for all official, medical, and pharmaceutical purposes, make use of the metric system of weights and measures.

This was the result of a report prepared by Oscar Oldberg, then chief clerk and acting medical purveyor, United States marine hospital service, in which he called the attention of the surgeon-general, John M. Woodworth, to the advantages of the metric system, and provided the necessary rules for expressing quantities in that system, and described the necessary methods to be followed in writing prescriptions.

In the United States navy medical department. In 1891 the bureau of medicine and surgery of the United States navy adopted the system, and published a small volume entitled "Instructions for Medical Officers of the United States Navy," prepared by medical director Philip S. Wales of the United States navy. In this work there is a "supply table" prepared on a metric basis, and supplies have since been issued in accordance with this system.

In the United States army medical department. In 1894, the medical department of the United States army adopted this system, and put it into application under the following order of George M. Sternberg, surgeon-general of the army:

After the 30th day of June 1894, the use of this system in writing official prescriptions is desired; on and after January 1, 1895, such use is hereby ordered. Until medical supplies now in stock in troy and avoirdupois weights are exhausted, the following approximate values may be considered equivalent in transferring original packages: 1 ounce equals 30 grams; 1 pound equals ½ kilogram; 1 fluidounce equals 30 ccm.; 1 pint equals 500 ccm.; 1 quart equals 1 liter; 1 yard equals 1 meter.

Accordingly supplies were purchased from dealers according to metric weights and dimensions, the army surgeons began writing their prescriptions accordingly without protest or difficulty, and the metric system was soon in successful operation.

In 1902, Gen. Sternberg, when asked why he would not go back to the old system, replied: "Because it (the metric system) is so decidedly superior. It is working smoothly, and we have no difficulty whatever—no protests on the part of the people we deal with, from whom

we purchase. The wholesale druggist must necessarily be familiar with it." *

An important test was made in the Spanish-American war, when the surgeons experienced no difficulty in conforming to the regulations.

COMPARATIVE TABLE OF APOTHECARIES' MEASURES.

In regard to the doses as they are now used in the United States the equivalents are as follows:

			Grams (*water*).
Teaspoonful	= 1 fluidram	=	5
Dessertspoonful	= 2 fluidrams	=	10
Tablespoonful	= ½ fluidounce	=	15
Wineglassful	= 2 fluidounces	=	60
Tumblerful	= 8 fluidounces	=	240

In a private practice, the administering of medicine is just as important as in the army or navy, and when the physician prescribes a dose of a teaspoonful, a dessertspoonful, or a tablespoonful, which is in well-regulated households measured in a graduate, the lines on the graduate can just as easily read 5 ccm., 10 ccm., and 15 ccm. (equivalent to 5, 10, and 15 grams of water), as one fluidram, two fluidrams, and half-ounce, or "teaspoonful," "dessertspoonful," and "tablespoonful." This will suffice to illustrate a few of the advantageous changes which can be brought about in medicine.

MICHELSON'S STANDARD CADMIUM RAYS.

I have treated this subject more superficially than it ought to be presented to this association, and have left many branches of the theme untouched, partly on account of the limited time, partly for lack of ability to properly explain them, for metrology is a science in itself, to which one cannot do justice without devoting ample time and thorough investigation. I regret that I could not investigate the history of the materials that have been used from time to time in attempts to find those which would fulfil the demands made upon them in regard to immutability, hardness, durability, low coefficient of expansion and contraction in changes of temperature, immunity from oxidation, etc., with a special reference to the linear standard of length, the meter of the Paris archives, made of platinum and iridium, which is the popular prototype. I regret also that I am not equal to the task of explaining the wonderful investigations of Prof. A. A. Michelson—carried on at the International Bureau of Weights and Measures, and later at the University of Chicago—who, a century after the metric system was established, found that the green rays in the waves of the divisible spectrum of the metal cadmium have a fixed and permanent length, which does not vary a micron as compared with the adopted standard of the meter, and is the same under conditions reproduceable at any time.

I feel, however, convinced that everyone of us finds it necessary at times to be familiar with the metric system, and I trust that I have presented at least a few arguments in favor of the general adoption of the metric system.

Discussion.

Dr. J. P. Buckley, Chicago, Ill. There is very little, if anything indeed, of interest that I can add to this most excellent paper by Dr. Stern.

* Report of Committee on Coinage, Weights, and Measures. (Hearing of Feb. 15, 1902.) Page 83, "The Metric System of Weights and Measures."

This subject is difficult for the average dentist to understand and appreciate. I only trust that after the essay is published you will study and endeavor to assimilate its ideas. It is difficult to comprehend why the English-speaking people of the United States and of England are so slow in accepting and adopting the metric system of weights and measures. It is true, as the essayist has said, that this system has been adopted by the government in the army and navy corps; that it is adopted now as the official system of the United States Pharmacopeia, but it is not used to such an extent that every physician writes his prescriptions in the metric system—unless born in a foreign country.

It is easy for me to understand why the essayist is so enthusiastic over this system, because he received his scientific training under Professor Hofmann.

If the author desires to publish any scientific work wherein references are made to weights and measures, he can do nothing better to make that work appreciated in foreign countries than to state the equivalents of the English figures in the metric system. It is easier for us, if we take the time to study that system, to convert the metric into the English system than it is for foreigners who are educated in the use of the metric system to convert that system into the English. I have heard it said by foreigners that they would consider it a waste of time to endeavor to convert the quantities of a prescription written in the English terms into the equivalents of the metric system.

I am not in a position to express any criticism of our forefathers, but it is difficult to explain or to understand why they refused to accept the English money system, the pound sterling, the shilling, etc., and adopted in the beginning the mill and the dime and dollar for money values, and yet retained the more complicated old English system of weights and measures. The metric system is nothing but a decimal system that was adopted first in France, and is called sometimes the French system. It is very simple if we take the time to study it.

Dr. N. S. Hoff, Ann Arbor, Mich. I want to compliment the essayist on the courage he has displayed in presenting to an audience of this kind a paper on this subject, which involves great difficulties.

As Dr. Buckley has said, he has left little or nothing for us to discuss. We must endeavor to bring this subject frequently before the people, because we must have agitation in order to create a change in the sentiment of the citizens of this country which will result in the abandonment of our present chaotic and difficult methods of computing weights and measures in favor of a system that is sensible and easily comprehended.

The essayist asks why we delay in this matter. That question has been asked by hundreds of men, and it is often in the mouths of our scientific investigators, who today are carrying on their work in the metric system because they have not the time to make intricate calculations according to our complicated methods. When once mastered, the metric system is as easy as counting ten cents to a dime and ten dimes to a dollar; it requires no exhausting mental process. Why, then, do we not adopt it, if it is so easy? I do not know; and yet I can assign one very strong reason why we are so conservative. It is because of our custom of holding on to things as a matter of tradition; it is that senti-

ment which causes us to be democrats or republicans because our fathers and grandfathers were democrats or republicans. We follow along the easy road of our environment, without a desire or effort to change. This seems to me a kind of conservatism which is reprehensible among a body of professional men who claim to be progressive and to have regard for time, skill, and ability. The essayist has very well said that, if these methods were adopted in our school system, practically a year of schooling could be saved for the child. Certainly, much of the complicated arithmetic could be avoided in the solution of problems involving fractions, which are not really necessary to the mental discipline of our children. While listening to the reading of this paper, I thought that it might be possible to save this year in the training of the children, and to add another year to our dental curriculum and to produce a better class of dentists.

Another reason why we do not adopt this system at once is because we are ignorant of its value for our work. There is no good reason why we should not adopt it at once for commercial and scientific purposes, to say nothing of the saving of time in the training of our school children. The metric system possibly explains why commercially and scientifically, and even in the secondary schooling, the people of the old countries are ahead of us. They are making wonderful advances which we usually attribute to their pedagogic methods. They do things on a different basis. Possibly their success is due to the simplification of their school studies, rather than to their improved pedagogic methods, for it seems strange that our Yankee geniuses could not follow and apply their methods to our school system.

I think it is high time that we as a profession should take some practical steps toward the adoption of this system in our own profession. It might be well for us to combine with the medical organizations in regard to this very important subject. It would seem that if this were done we should overcome to a great extent this conservatism that has held us back for years and is making us the laughingstock of foreign countries. What can we do as the dental profession? We can at least insist that textbook writers use the metric system in our text-books. Some writers now state the metric equivalents; but this will not fully answer the purpose. We must utilize this system in our everyday commercial relations, and as the essayist has said, there is no better way possible for us than adapt it to the buying and selling of precious metals, the dental practitioner being very materially interested in these transactions. He buys gold, silver, and platinum in various forms every day and becomes accustomed to the terms of the weights and measures in which these metals are bought and sold. Why can we not translate these figures into the terms of the metric system, so as to bring them before the profession in the quickest and best way by compelling dentists to practically think in the terms of the metric system? If this could be done, we would very soon all understand the metric system and appreciate its value.

I would offer a resolution, which we might possibly adopt on this occasion:

Resolved, That it is the conviction of the National Dental Association that the metric system should become the accepted standard of weights and measures in all professional and commercial transactions.

To accomplish this purpose at as early a

date as may be practicable, it is urged that all physicians, dentists, druggists, and dealers in precious metals be urged to put into practice this system of weights and measures at once; and it is further

RESOLVED, That this resolution be published with the proceedings of this association, and that a copy be sent to all the dental journals and to the secretary of the U. S. Pharmaceutical Convention, Dr. Murray Galt Motter, 1841 Summit Place, Washington, D. C.

I would move the adoption of this resolution, and therewith close my discussion.

Dr. BUCKLEY. I would second that resolution.

The resolution was then put to vote by the chair, and declared carried.

Dr. STERN (closing the discussion). My sole object in writing this paper was to awaken an interest in the metric system, which I am sure will be adopted universally very soon. The journals are taking it up, as may be seen in our daily papers.

I have here a clipping called "The Universal Yardstick," taken from a newspaper, in which a long description is given of the metric system and of what Dr. Stratton has done in that direction. I have several other articles in which this subject is impressed upon the public's mind.

As late as last week, the authorities at Washington issued an order that all goods intended for shipment to Spanish ports must be invoiced in Spanish, and that the metric system should be used. This order includes shipments to Cuba and our territories beyond the sea and is a result of the Spanish-American war. The mere fact that we have and control territories which use the metric system exclusively is tending to lead all merchants engaged in shipping goods to those ports to adopt this system. One thing is gradually bringing on another, and I hope that in the very near future the metric system will be exclusively adopted.

The Decennial Board of the United States Pharmacopeia is in session now for six months, and I am sure they will insist upon further elaborating this system.

The section then adjourned until Thursday afternoon.

THURSDAY—Second Session.

Section II was called to order at 2 P.M. on Thursday by Dr. Frank I. Shaw, Seattle, Wash., vice-chairman.

Dr. SHAW. I take pleasure in introducing to you Dr. F. L. Platt of San Francisco, who desires to say a word relative to holding a meeting of the National Dental Association in San Francisco in 1915.

Dr. F. L. PLATT, San Francisco, Cal. I wish to extend to the National Dental Association an invitation to the city of San Francisco to participate in the celebration of the completion of the Panama

canal in 1915, at which time we shall hold the Panama-Pacific Exposition and International Dental Congress, and I assure you that every member of the dental profession, from the northern limits of the state to San Diego, will extend you a royal welcome.

San Francisco at that time will be reconstructed into a better, more beautiful and grander city than it has ever been before.

In San Francisco alone over seven millions of dollars have been subscribed for building the Panama-Pacific Exposition structures. The people of the state of California have asked no aid from anyone, but are prepared, in spite of all that they have had to contend with and in spite of all that they have had to expend for rebuilding the city of San Francisco, to appropriate the funds to insure the greatest exposition ever seen.

We want the National Dental Association to be there with us to join in the best and biggest world's congress ever held. We will entertain you and take care of you in our magnificent hotels, and we will show you the beauties of our state and of the coast from British Columbia to Mexico, and make it a trip worth while from every standpoint—social, educational, and professional. We want you to be with us.

The next order of business, as announced by the chairman, was a paper by Dr. J. G. Sharp, San Francisco, Cal., entitled "The Obstacles to Our Educational Progress, and Their Correction," as follows:

The Obstacles to Our Educational Progress, and Their Correction.

By J. G. SHARP.

Believing the highest motive that can prompt one to action to be that which has for its object the welfare of the human race—though the action be lacking in personal gain or even be made at personal sacrifice—and that the highest standard of citizenship in an individual is most strongly manifested in a full and righteous discharge of the duties which he is privileged to perform in any calling he may choose, I have chosen to present a topic that should arouse you to a broader realization of your professional duty than a merely conscientious professional relationship with your patients. This is an excellent quality in itself, but a far more important one is that you and all of us combine to see that others do likewise, and that where one member of our profession is doing all in his power to promote higher standards in his profession, there are not equally as many others exerting themselves to the utmost to defile it. This condition we find in all walks of life, no less in ours than in others. In our profession, however, we have the additional incentive to a higher motive that "we are dealing with the physical, and consequently the moral and intellectual well-being of our people," and for this reason should exercise greater vigilance in bringing it to the highest state of excellence. It is a noteworthy fact that in our country less thought and

less support, both moral and financial, are given to the educational advancement of medicine and its allied professions, such as dentistry and pharmacy, than to other branches of study, yet how much more far-reaching are they in their application, and in how many cases how dependent are the enjoyment and success of all other branches of education upon these!

NATIONAL STANDARDIZATION OF SCHOOLS ADVOCATED.

As a rule, an educated brain springs from a healthy body, and it stands to reason that any science or combination of sciences that leads to the latter condition is of inestimable importance and should be encouraged to the highest degree in order to secure the former. Dentistry certainly forms one of these combinations. In other words, with this object in view there should be a strong combined and systematic effort made by our profession to bring about a proper standardization of our schools, of our boards of examiners, and college associations, as well as of ourselves, whereby we will all be working toward the same goal, that of high professional and educational attainments. With these various factors, isolated one from the other as they are, each with dissensions of its own, the true issue of their organization has been so befogged that they seem almost as toys for the edification of those who are in control, and our educational standards in the meantime are left in imminent danger of dying a natural death.

The success of our schools, based upon financial competition and aggrandizement of the members of their faculties, the appointment of our boards of examiners because of their political rather than their educational attainments, an organization of our dental schools for the protection of its members, and our own indifference to it all, present a formidable barrier to our professional and educational progress, and expose our standards to the ridicule of foreign nations and to the scorn of the American people.

Yet such is the undeniable status of our profession at the present time, with no hope of a guaranteed basis of adequate national standardization, unless we, as an organization representing the dental profession of our country, demand it, and through the medium of an educational council of this association recognize only such schools as can prove their ability to maintain it.

A basis for such standards for recognition by this association should be—Guaranteed preliminary qualifications for admission, with a certain minimum standard of prescribed curriculum in a school which is a department of a university, itself having a standard secured by some higher organization.

This would represent a great progressive step in our dental schools, and tend to demand of our greatest educational institutions proper recognition of our professional worth. If we continue to permit without protest the recruits to our ranks to come to us from schools of low caliber, poorly educated in dentistry, with even less of general intellectual attainments, it is but an admission on our part that our profession is unworthy of anything better, and totally unworthy of university consideration, or of recognition by our higher authorities at Washington. It would further tend to have such universities as already provide dental teaching cast off their dental schools and set them back where they began in their upward growth.

STANDARDIZED UNIVERSITY CONTROL OF DENTAL SCHOOLS A GUARANTEE FOR A HIGH STANDARD.

The control of many of our dental schools by our better universities has been the result of years of untiring loyalty to our profession by certain of its members, and such a disaster as just mentioned would require more years to overcome, particularly as the men who have worked hardest for this condition would not undertake to do so again, carrying with it, as it does, a tremendous personal sacrifice. But even the further carrying on of this work, so well begun, is no easy task and will require your earnest support. In advocating university control of our dental schools, we are informed that this is the tendency of many of our private schools and corporations at the present time; but we must keep in mind the fact that many of our so-called universities are no better than many of these schools themselves, not being standardized; I am convinced that upon investigation we would find that they merely lend their names to them without exercising the slightest authority over them or tendering them any financial support. This merely strengthens such a school in its competition with other schools for student enrolment, and is as great or even a greater menace to our educational progress than the schools would be if left to themselves. Generally speaking, such a university will be found to have no university standing at all. I speak with much compassion for those faculties of privately conducted dental schools that are honestly maintained. However, they offer no guarantee for future high standards, as the time must surely come when they will feel the sting of keen competition for students, and their standards will be proportionately lowered or they must cease to exist.

To those who are intimately acquainted with the educational problems of the day, it would be hardly necessary to go farther in an appeal for better conditions. Realizing, however, that the great majority of our profession are not conversant with this subject and that their support is absolutely essential to the success of the efforts now being made to elevate dentistry, it is necessary to present a careful analysis of the obstacles arising in our path; not in a vindictive manner, for the standards I am appealing for today are those that my own faculty has been working for years to have adopted for its own school.

THE FACTORS CONTROLLING DENTAL EDUCATIONAL STANDARDS CENSURED.

To begin with, there are four important factors in our profession bearing a close relationship to our educational standards. They are the schools, the boards of dental examiners, the faculty associations, and our profession at large. From the latter are made up the three former, and the question, so often of paramount importance, is, What can the position on one of these bodies do for us? rather than, What can we do for the position?

The colleges. As a college man I should consider the colleges as a class, more than any other of these factors, fundamentally responsible for the low educational standards of our profession: dependent as they so often are for their success upon their own financial resources or their ability to produce funds within themselves. As a result we find one school competing with another for students, offering all sorts of induce-

ments for keeping the treasury full. We may also find on a careful inspection of many of our schools that membership in their faculties is a profitable investment from one standpoint or another. However, for the purpose of keeping the student enrolment up to the necessary limit, we find a woful lack of preliminary qualifications, quantity rather than quality of applicants for matriculation being of prime importance. We find endless other inducements offered as a bid for students, such as healthful climatic conditions, page after page of illustrations in catalogs of beautiful park surroundings and private gardens, with an occasional mention of some nearby mountain resort, and even possibly a wilful misrepresentation of the curriculum or special part of the curriculum or of the school or equipment. In short, the advertising feature in many schools might be found to excel all other departments, and certainly is designed to make business good for the schools. From an educational standpoint advertising is a most unimportant factor, and certainly is not intended to advance the standards of the profession any more than it would enhance the ethical standing of the individual member of such a faculty who might resort to such methods.

The boards of dental examiners. The schools, which should be the pride of our profession at home and demand the admiration, respect, and recognition of foreign nations, are, by the methods pursued for their maintenance, reduced to a commercial enterprise, and will hold us up to ridicule and scorn until our profession arouses itself to an appreciation of its full power and demands a properly guaranteed standardization of them. You might ask if schools are really so bad, but the answer to your question lies in the fact that you, in your various states, making the laws for that state, have provided a censorship over them in the appointment of a board of dental examiners, giving the control over to politics instead of placing it in the hands of your state university, the most highly constituted intellectual organization you possess, and which is, generally speaking, removed from politics and organized purely for educational purposes. Fancy the ludicrous position of your state universities, which should be supreme in intellectual attainments and ability, censured by a reversal of their decisions by a body of men who, generally speaking, do not possess the educational qualifications of a teacher, and who are not familiar with the college curriculum. When a state or endowed university existing under guaranteed high standards has recognized our profession as of sufficient moment to establish or receive dental schools and secure for us their own guarantee of standards, then they should receive our unqualified indorsement, and every obstacle to their unlimited control of dental education should be removed. The recognition of such universities and their standards by our federal government should also be indorsed by this association. And I repeat, that a lack of such indorsement is but an admission on our part that we are not worthy of such a standard or such consideration by our universities. On the other hand, such an indorsement would show a keen appreciation of our duties toward the public welfare, and a national pride in and disinterested personal loyalty to our profession. It would place our schools beyond the scorn or ridicule of our profession or the need of examining boards, which are no more and possibly are less efficient than our college faculties, and

have at best, in many instances, only slightly curbed the output of the schools without in any sense correcting the cause of the evil. They are so busy mopping up the floor that they neglect to turn off the faucet. I cannot refrain from adding one more word of criticism of our examining boards as to their method of examining applicants in general without first having ascertained the moral and at least the preliminary educational status of the schools from which they come and upon which the boards rely for their information regarding this most important factor; for I believe, from a knowledge of conditions, that some of the schools they recognize have no moral status themselves, and cannot be considered as reputable. The method I refer to is that of examining and passing upon the applicants for a license in the short time in which it is done. This is an injustice to the people of our country, for often a worthy candidate is rejected, and an unworthy one allowed to advance; it is an injustice to the candidate, as a worthy one has a perfect right to advance and an unworthy one should be stopped for his own good. It is an injustice to our profession, because such mistakes only leave our professional standards in a doubtful state. It is an injustice to the boards themselves, as the discrepancies of one reflect discredit upon all.

The National Association of Dental Faculties. The boards accept as our only available standard that of the National Association of Dental Faculties as a sufficient guarantee of the standards for the schools that form its membership; but here again we fall short of any method of standardization that we can look upon with any degree of security. This association employs no method of guaranteeing standards of schools except the medium of the dental boards—for schools, to become members of the National Association of Dental Faculties, must be indorsed by the board in the state in which the school is located.

Hence the chaotic condition in which we find our educational status: The schools conducted to a great extent for their own personal gain, and dependent for their membership in the National Association of Dental Faculties upon the indorsement of the dental boards in the different states—which boards in return depend to a great extent upon the National Association of Dental Faculties for the standing of the schools from which they receive their applicants; truly a complex system, but not possessed of the virtue of any sound foundation of educational standardization either by the schools or the boards. If a standard of education does exist, what means have we of knowing that the different schools maintain it?

INADEQUACY OF THE RULES OF THE NATIONAL ASSOCIATION OF DENTAL FACULTIES FOR MAINTAINING EDUCATIONAL STANDARDS.

So far as I am aware, membership in the National Association of Dental Faculties, our recognized organ of standards, offers us no assurance on this point, for it possesses no means of controlling the schools that make up such membership. It merely prescribes that certain things shall be done and taught by its members and relies upon them to do its bidding, which many do only in so far as it suits their own convenience and welfare.

Let us analyze some of the rules governing schools which are members of the National Association of Dental Faculties:

First, Rule I, that governing entrance into the schools, in which it is stated that "Matriculants shall have graduated from an accredited high school or show the equivalent of such a course; this to be determined by the superintendent of public instruction or his appointee." When such a superintendent himself examines or appoints an examiner, it is done as a favor to the schools and not by virtue of any power vested in him by the laws of his state. Such is the condition in the state of California. As a result, each school may recommend to the state superintendent of public instruction for appointment, as examiner for itself, any person who seems fit or willing to meet its demands. As far as educational standardization is concerned, any member of the college faculty would be equally efficient.

Rule 18 provides that "The tuition fee of all schools, members of this association, shall be $150." A trust clause, as it only acts to prevent one school securing students that another wants. It is not an educational problem, and is an affront to any university that insists upon conducting its own internal affairs. It should further be the desire of such an organization to encourage securing an education in dentistry by lowering the fees, rather than to discourage it by maintaining high fees.

Section 4 of Article III of the constitution of the same association, rather ambiguous in its intent, provides for the appointment of a committee to investigate an applicant for membership in the association, as to the number of students it can instruct, whether it seems primarily organized for the purpose of strengthening another already existing institution of some sort, or whether the city in which it is located already has a dental school of proper standing. In California we have three dental schools, and I think, after many years of experience and thought along these lines, that if they are all dependent upon the fees of their own student enrolment, it is impossible to conduct them on a high plane.

Section 3 of Article IV provides that "This association and its members shall not recognize any dental school that does not conform and comply with these rules and regulations." Can schools conducted purely in the interest of dental education conscientiously comply with them?

Section 11 of Article IV provides that "No one connected with the schools of the association shall serve on any state board of dental examiners." Should not such an association encourage the best men to be on college faculties? and therefore should not college faculties be represented on the boards, if educational standards and not the welfare of the schools are the motives for their existence?

CONCLUSIONS AND SUGGESTIONS.

In conclusion, I must add, although I say it with both pride and sorrow, that because of the National Association of Dental Faculties being powerless to enforce its good rules, and because of its many poor ones, many good schools felt compelled to abandon their membership in it. It certainly commands our pity that an organization so worthily begun should falter in its progress, and that the real object for its existence, the protection of our people through high educational standards, should give way to the welfare of its members. I speak especially of that body because it has been the only recognized organ for the standardization of our educational institutions.

I urge upon this association that it take steps immediately to adopt a properly secured standardization of our educational institutions by demanding their control by standardized universities. Is your profession worthy of such an effort? Your co-operation in or demands for such efforts will only hasten the culmination of what is inevitable; it will strengthen the progress of the good schools by aiding their recognition by these universities, and it will tend to lessen the influence of the weaker and poorer ones that cannot gain this recognition.

It seems to be perfectly clear that schools which are unwilling to give over the control of their affairs to the highest educational institutions that we have, are being conducted for other than purely educational purposes. It also seems certain that if we, as an organization, do not act in a manner that will militate against the existing conditions, we are falling very short in our duties as prescribed by our constitution.

In dentistry, as in all other callings, we have parasites and producers, and the question arises, To which class do we belong, or to which class shall we tender our aid? for if we are to advance, and if we possess a full appreciation of our responsibilities, we cannot remain silent. We must be the influencing body by placing our approval or condemnation where it belongs. We must remove the stigma placed upon our educational standards in foreign lands, that our colleges cannot be trusted to certify to the qualifications of their graduates to practice dentistry, but must further be tested in the different states by politically appointed boards. We must so adjust our system that members of college faculties, who should be best qualified to act, can be entrusted with this important mission. I have but touched upon the various problems incident to our educational progress or retrogression, feeling that the time at our disposal is too short for further details. However, I look upon this subject as one of most vital importance to our profession at the present time, and believe that for that purpose an educational council of this association should be created, through the medium of which this association could be kept constantly informed as to college standards, and could indorse schools that are properly maintained.

Discussion.

Dr. B. Holly Smith, Baltimore, Md. This question has been discussed and rediscussed, and if I felt that its further discussion might find us in a perfectly equitable frame of mind, with friendly purposes toward each other, I should perhaps enter it with more zest.

When the essayist, Dr. Sharp, was a mere man, he impressed me with many attractive personal qualities, but since he has become dean of the University of California he has assumed an aggressive tone, and in my judgment has done much to set back dental education in this country, to depreciate the American degree, and to bring into our very organization disunion and disloyalty.

I ask him to pardon me if I speak in direct words. I speak without malice. Goodness knows, if at any time men with large hearts and large thoughts should try to reach out and bring together the various stragglers of our profession, it is today!

Dental education has made great strides in this country, which should inspire every thinking member of the profession with greater pride than any other

achievement that I know of in education. Our degree may have been dishonored. Unholy is the action of anybody who has contributed to its dishonoring!

When we remember that in twenty years the Faculties association has, through its various instrumentalities, brought the teaching of dentistry to a state of perfection and effectiveness which has brought forth the congratulation of everyone who has thought seriously upon this subject, we have a right to expect all sincere lovers of our profession to join heart and hand in its work. Yet the reader of this paper has seen fit to form into a different organization men who, because of their unwillingness to live up to the regulations of the Faculties association, were ready to join such a movement, and now claim, by reason of their casual connection with some university, a superiority over colleges of the Faculties association. This condition has brought into the teaching of dentistry in this country a disloyalty and disunion which does not make for progress, but the reverse.

The time is not too late for the essayist, if he really has an ambition to serve, not the corporation which he represents, but dentistry, to seek the cooperation of not only this association but the Faculties association, and help them in maintaining a uniform standard of excellence.

To make a plain statement, I really think the presentation of the essayist's paper to this body an impertinence.

I could discuss various items of this paper, but I do not think it worthy of discussion.

Dr. J. D. Patterson, Kansas City, Mo. I was not on the program to discuss this paper, but wish that I had been, so that I could have made more careful note of some of the statements to which I shall object. I have felt very deeply the injustice done to the dental educational system of this country. In that system certain forces have been at work for a great many years, and I, in my humble way, and scores of others, have been honestly connected with them for the furtherance of the best in dental education. To hear these efforts arraigned before the National Dental Association in such an unjust manner almost paralyzes any speech that I might make.

The college faculties and the examiners are arraigned alike, and I hope that someone here will speak for the examiners, because in his essay the writer says they are only a little less vile than the faculties—these are practically his words.

Even if in the membership of the Faculties association there were colleges which did not live up their promises and to the best that was possible for them, is that any reason why this wholesale denunciation should be made of that association, which, as you and I and the profession know, has been responsible for the advances made in late years in dental education, whatever criticisms may and can be made. Whatever criticisms you may utter concerning that association, you must credit it with the advancement made in dental education, the perfecting of the curriculum, the broadening of the field, and the creation of the possibility of raising dental education the world over. It has worked earnestly and honestly with or without the Examiners association. Many of us in the Faculties association would have liked to go ahead faster in improvements in preliminaries and in requirements for graduation, but it is our duty to go as

fast as we can and work with the majority, because that is the only way in which we can progress. No party that is working for progress can improve if individuals composing it are pessimistic and work for their own ends. I consider it a very foolish proceeding to launch a criticism against the whole membership of the Faculties association and the Examiners association because some members may have been delinquent. To berate the entire body because some member of the organization is guilty of wrongdoing is unjust.

The essayist says that the membership in the Faculties association has been profitable, and insinuates that men have joined it for that reason. I will not argue that question. I will leave it to your own common sense whether such a statement is within the bounds of reason and true, or, like many other statements, is made purely upon a fictitious basis, owing either to ignorance or to wilful misrepresentation. These are his words: "They wilfully misrepresent what they will offer to the student." They do not wilfully misrepresent, if afterward they offer that teaching to the student!

There are some passages in this paper which do not deserve anything except contempt. The essayist says that the faculties in our colleges are so busy "mopping up the floor" after graduating the product which they turn out upon the public, that they "forget to turn off the faucet" for the next term. Is such a low expression justified before intelligent men in this, our National Dental Association?

My information may be very erroneous, but I have been in nearly every college of the country, I know their faculties, I know their methods, and I believe that the essayist does *not* know their methods, and such criticism cannot and must not pass unchallenged.

The essayist states that the Faculties and Examiners associations have no method of standardization. Their method of standardization is really such that the essayist's new College association could not come up to it, and had to withdraw. There is the trouble. If I had the time and the inclination, I would recite the whole history of the new College Faculties association. While I do not say that the college which this man represents was concerned in it, the colleges from which came the genesis of this new association would not abide by the rules of our association and so they resigned. This statement can be fully substantiated.

The essayist says that the Faculties association has no rule, or, if it has any rules concerning the standardization of teaching, they are not obeyed. How does he know that they are disobeyed? He is not in the association. He knows that during the time he was in the association time and again faculties were suspended and fined, and their representatives were made to get up on the floor and were censured by the association because they violated the rules. The essayist knows that an earnest effort has been made toward standardization, and not only that, but the Faculties association has compelled its members to live up to those standards. Its methods of enforcing rules are better than the methods employed for that purpose in any professional association of which I am cognizant, and they are carried out; and their being carried out so well is the reason why we have this new association!

In regard to the methods of holding preliminary examinations, the essayist intimates that the colleges might hold

these just as well. Being the author of the system of giving preliminary examinations and ascertaining the qualifications of the would-be student outside of the jurisdiction of the faculties of the colleges, I am compelled to speak about that point for just one moment.

I have heard it said that there are superintendents of public instruction in some states whose examiners may be influenced by some person connected with the colleges; but I assure you that I know that in nearly all, if not quite all the states, the superintendent of public instruction is not a man who can succumb to such influence. If he does not examine the candidate himself, the men whom he appoints are just as unapproachable. This system may have its disadvantages, but at present, as far as I know, we are working under a good rule.

Time and again men are turned down in the college with which I am connected; they are advised to return to school and then to try once more. Yet the essayist intimates that most of these examinations are influenced by the colleges. Do you believe that? I *know* that it is not so. Then the essayist descends to a diatribe as to the fee which the Faculties association charges. I know something about that, too. I was the originator of the fee, and the only reason for making that fee high was that we could give to our students more teachers and better facilities. The records of the association prove that that was the only motive which prompted the raising of the fee. Many colleges, by reason of this increase in the fee have been enabled to offer far better instruction than they had ever given before, yet the essayist's intimation is that it was nothing more than a trust clause, and he even makes the worse intimation that the fee was made higher so that we could put another dollar into our pockets. What good is such criticism, unless it has its foundation upon records and absolute truth?

I know the faults of our college association, those of my own college and of others, but the insinuations made in this paper have no good foundation.

I beg pardon for speaking so warmly. I never saw the paper until this morning, and wish I could have written a more dignified reply, yet it seems to me that there are statements made in regard to the Association of Dental Faculties and in regard to college men and college teaching that demand drastic methods of dealing with them.

Dr. George R. Warner, Grand Junction, Colo. The reading of this paper before this audience seems like exploding a bomb, but none of us can overlook the vastness and importance of the subject. I feel that I am qualified to discuss but one point, as a past member of the examining board of this state and a present member of a board of education. Having been interested directly in the secondary schools for the past seven years, I want to speak on the preliminary educational requirements only.

We all will acknowledge, I am sure, that one of the great obstacles to the advancement of professional education, particularly in medicine and dentistry, has been the lack of preliminary qualification. There has been a lack of standards as to preliminary education, and the sooner we standardize the preliminary qualifications and the more honestly we adhere to that standard, the sooner shall we remove this obstacle to dental education.

As a member of the examining board of this state, I found that many of the

candidates who came before our board—a pre-requisite being the D.D.S. degree—had no idea of the use of the English language. I believe many a foreigner who has been in this country but a short time could write a great deal better English than we discovered in very many papers. All members of examining boards present here will probably agree with me in this criticism. Of course, it was some six years ago when I was on the board, and I believe that at the present time the preliminary qualifications are adhered to more carefully and conscientiously. I would presume that the papers now presented to examining boards do not exhibit such execrable English as the papers which I read during my incumbency.

Just as a matter of curiosity, I made out a list of the misspelled words at one time, and of all the curious spellings I ever heard of or saw, the words in my collection took the prize. They could not be ascribed to any dependence on the laws of phonetics, because not even by the most far-fetched method could they be made to sound like the words which were intended to be represented. Where these persons received their ideas of spelling and the rendition of English, I cannot conceive, though I am quite sure that they could not have acquired them in the graded high school. I found that they had no conception of the rules regarding punctuation, and very many had no control of the hand in penmanship. If they were able to control their instruments in operating no better than they controlled the pen, I should be sorry for their patients.

How are we going to standardize this preliminary educational matter? There is a great variance of opinion upon this subject. I am going to suggest, as a present possibility, that we require graduation from an accredited high school. I hope that soon two years of a B.A. or B.S. course will be required, one of these degrees, possibly, to be obtained concurrently with some dental technique and other preliminary dental education. An accredited high school, according to the conception of the North Central Association of Universities and Colleges, represents a standard which is certain and definite, and if the faculties would require the candidates for matriculation in dental colleges to have a certificate from a high school which is graded according to that standard, they would have something definite to work upon.

Dr. C. S. Butler, Buffalo, N. Y. My only excuse for saying a word on this paper is my deep interest in and the somewhat intimate relationship to the schools of our country which I have had for a good many years. I sometimes wonder whether any real gain can be derived from an indefinite and non-specific attack upon our schools. I am one member of the profession who believes that our dental schools have never been given all the credit they are entitled to receive. There is no other profession which has made such progress in its educational department as has been exhibited in the schools devoted to the training of men for the practice of dentistry.

You must remember that they not only had to develop their own methods, their own curriculum, but that they had to devise their own ways and means, and this process has been going on for a period of only about seventy years; yet our educational institutions today rank relatively high among the learned professions. When we take this view, it seems to me that we are somewhat harsh in our criticisms of the schools. I know it to

be the habit, and almost custom, of many members of our profession to condemn the schools without reservation.

As to orthography and grammatical construction of sentences, if you were to go back thirty or thirty-five years and inspect the examination papers of that day, I wonder what they would reveal. I am afraid they would show even a worse condition than those of the present day.

These conditions, while they are to be deplored, should not discourage us. I believe that our schools, with the opportunities and facilities at their command, are doing good work. Some are doing better work than others, but can we gain anything by coming together in our convention and indiscriminately condemning the schools?

My experience in life is that you can always accomplish more by endeavoring to lead men out of error to the truth rather than by dragging them forcibly. So I feel encouraged regarding our schools, especially by the efforts which they have made themselves during the past few years toward adopting a higher educational preliminary requirement.

In the state of New York we have a very good standard in that regard, perhaps one as good as any of the states have, a higher one than many possess; but that is no reason why we should insist that every other state should come up to that standard whether it has the facilities for doing so or not, and risk the penalty of having their schools go out of existence. It seems to me that when this whole problem is considered in an optimistic and generous spirit, the better way, after all, is to encourage the schools that are not up to the standard which we feel they ought to have, stimulate the men at their heads who are responsible for their conduct, and help them by showing them the better way, rather than openly condemn them in our National society because of what to us may seem to be an error.

Dr. C. R. E. Koch, Chicago, Ill. I regret exceedingly that I have had no opportunity of reading this address before it was delivered.

The essayist starts out with the statement that the colleges are entirely for the benefit of the people, which is correct —it should be so. He assails the dental boards and dental faculties, which he has a right to do, of course. Lawyers say that whenever you take exception to the bill of another lawyer, you should be able to write a better one. I concede that the essayist may have some foundation for his faultfinding. None of us claim that we have reached perfection. When we do reach that era, it will be time for us to retire and let others take up our work.

If we abolish the "political boards," and put the state universities in charge, in what way are we going to better the condition of affairs? Who controls the state universities? Many states have no state universities. Are not the trustees elected by the people, and do they not have to take up politics and use their influence to be elected? It is possible that the essayist has had his vision confined to the horizon of the Golden Gate, and is speaking simply and purely from the viewpoint of conditions that this afforded him. If that is the case, I have no argument to make. In Illinois we do not have such conditions.

In Illinois we are progressive, as I believe the entire country is. Where did our educational institutions stand thirty years ago, when both the Examiners and the Faculties associations were in their infancy? Where did the practitioners stand as far as preliminary and dental

education is concerned, compared with what we offer the people now? Progress has been made all along the line from year to year. To say that the power of regulation must be taken out of the hands of the Faculties association and the Examiners association and put into the hands of this association, and that this association shall instruct the people of this country and the United States government as to what is to be done, is a *reductio ad absurdum.* It is absolute folly. Who has constituted this body a representative body? What has made it a representative body? You are trying to make it such, but certainly no fair-minded man can claim that this body is today a more representative one than the body which comes from the appointive officers of the people, the examiners from all the various states who annually consult with reference to this matter, having in view the various needs of their own states, and trying to bring them into accord so that all the American people shall have a unified system as far as this is possible. Is it more representative than the men who come here fresh from the schools, from experience with their classes, and meet yearly to compare notes?

I do not wish to impose upon the good nature of this audience, but let me say that the people of the United States have some rights which this assembly is bound to respect. The Faculties association, aided by the Examiners association, has gradually increased the educational standard in dental schools, and they should be accorded all due credit for what they have done. They have raised the standard of dental education from no preliminary education whatever to that of a completed high-school course.

The Faculties association has made a rule for cases in which the high-school education of a prospective student has been obtained in an irregular way and is not established by a diploma, saying even to the great universities, "You will not be permitted to determine the educational qualifications of your own students so far as the department of dentistry is concerned. We will take that out of your hands and place it in absolutely impartial hands, *i.e.* in those of the highest official of education that the people of the state have selected; he shall determine the eligibility of students to matriculation in the dental school."

I want to say to you, as a representative of a great university, that it has astonished me that it has submitted to such interference with its prerogative; but I have been informed that it did submit because it believed it to be for the best interests of dental education and of the service of the people and of science.

In regard to another point. Do you know that there is a scarcity of dentists in this country? If you do not, the gentlemen who conduct the dental schools will tell you so. There has not been a week in the last three months that I have not received a letter from some town in the Southwest or Northwest or extreme West, saying: "We have a community of from 800 to 1600, and we have no dentist nearer than fifteen miles. We can well take care of and support a dentist; can't you send one?" We have no men available, and I think that is the experience of all who are connected with schools. Therefore, if we have reached the utopian mark of insisting that we shall have only men with a college education enter the profession of dentistry, we shall practically deprive the people of dental service.

The agitation of dental hygiene that

is now carrying the people away all over this country is making greater demands upon the schools for more qualified dentists, and we must consider the people's rights in this matter. I for one, in my individual capacity, would "stand pat." I believe we have gone far enough. I believe that the time has come when we should adjust the preliminary curricula so that we shall all understand the same thing in the same way.

Everyone here has spoken of the standard of education. There is no such thing. I have been surprised in the last two or three years, in investigating what the standard of education is, to realize that there is none. There are certain curricula that approximate a standard, and the high state officers will measure so as to come the closest to the standard established in their individual states.

I beg of you to support your schools. All the schools struggle along the best way they can and obtain for you as good results as it is possible to obtain. Speaking of the matter of finance, no school can furnish education or equipment or maintain a successful course of instruction without money, and as long as dental schools are not endowed, they will have to receive money from the students in order to offer proper teaching.

At the Northwestern University—and I am not saying this by way of advertisement but simply as reflecting what has occurred in most of the other universities—four years ago the requirement of two years of high-school attendance was raised to a completed high-school course. The result was that our freshman class, which in 1905 numbered 166, was only 66 in 1906. Do you think that there was no financial sacrifice involved in that? The university has contributed since then upon the altar of higher dental education not less than $30,000 by reason of diminished fees. At least four out of every five men who applied were rejected until they could qualify, and some of these have come in later. The work is now going on well. Do not discourage the faculties; encourage them in their efforts.

Dr. W. E. Grant, Louisville, Ky. It seems that the essayist by his suggestions has attempted, at a late hour, to appropriate some of the useful recommendations that have already been put in operation. We have an Educational Council of America composed of fifteen members, which was provided for a year ago, five of the members being elected from the National Dental Association, five from the National Association of Dental Examiners, and five from the National Association of Dental Faculties. This counsel of fifteen has been at work during the past year. We have had four sessions since we have arrived at Denver, and many of the problems that have been hinted at in this paper have been and will be considered.

It certainly seems to me that this association does not need to take action on the suggestions offered in this paper, as the council of fifteen, representing the three national dental bodies of this country, is deeply interested in the question of education and can be relied upon to solve our educational problems. Those of us who have given thought to this question for the last twelve months, and who are now earnestly at work on some of the many problems confronting us, are very enthusiastic over the work we are undertaking and its possibilities.

Dr. A. C. Wherry, Salt Lake City, Utah. It is with a great deal of reluctance that I would attempt to say a word on this question, after the assurances of

the last speaker. They are, without doubt, the very thing that we would ask for and which we feel is needed.

The essayist's paper represents an attack upon all of the faculties and all of the schools. No one will deny that Dr. Patterson is thoroughly competent, reliable, and thoroughly sincere in his efforts in the educational field, and the same can also be said of Dr. Brophy, Dr. Kirk, and numerous other members of the Faculties association. But after a few years of labor in the state boards, we cannot but feel that there is justice in the demands of this paper. We must admit that the essayist had grounds for his fears and his suspicions. And why should we become angry because he has come before this association and voiced his fears and suspicions? I think we should be men, and meet this question face to face.

One of the speakers enlarged upon the demands made by his school and upon the advancement made by his state and its schools. Gentlemen, I want to say to you that that same man and that same school have made a very aggressive campaign to secure questions from the state boards of this country. Why did they do it? In order to prepare their candidates to meet the state boards, and not to serve what the public needs, namely, its welfare and its protection.

Referring to the question of putting the matter of educational requirements in the hands of the state superintendent, you allude to this superintendent's competence, because he is selected by the people. But if you were to prosecute a few cases in the county courts, you find that you generally have a weakling of an official to prosecute your case for you; if you want to obtain a conviction you must have competent counsel; also, if you want the requirements lived up to, you must know beyond any doubt who is to examine the candidate.

The day I left my office to attend this meeting, I had an applicant apply with tears in his eyes for permission to take the examination before the state board. He assured me that he had attended school two years in a recognized dental college. He could not furnish any credentials because he had never met the entrance requirements. Nevertheless, if he attends one more year, there will be a way for him to obtain a diploma, providing he passes the dental subjects. Judging, mind you, from the past, but with the hopes held out to us by the last speaker, I trust this candidate will not pass.

I want to remark briefly upon the words of Dr. Warner. We have men apply; we accept credentials which they furnish us from reputable dental colleges; they write their papers, and it would take more than ordinary intelligence to give some of them their just dues, because you cannot read their papers; you are unable to decipher what a man has put upon his paper, and if you give him the benefit of the doubt, you must mark his paper "10," because perhaps he meant right. But did he?

Our requirements of preliminary examination must be advanced. Dr. Patterson, Dr. Kirk, and any of the colleges which maintain the standards which they are supposed to maintain, will admit that. Mind you, I do not say "I am holier than thou," but there is always the weaker sister, and you must take care of her.

Dr. Guy S. Millberry, San Francisco. I want to speak upon this subject, chiefly because of my admiration for the essayist, Dr. Sharp. From my associa-

tion with him during the past four years, I know that no man in the state of California has greater courage of his convictions or is willing to express them more freely than he. Several questions have arisen regarding the matters which have been presented to you today, and by one speaker it is said that these statements are untrue. I can assure you that they are founded upon evidence. The evidence has been gleaned from correspondence with the schools throughout the United States and from the proceedings of the national associations which have to do with dental education. If any member of this National Dental Association or any committee which you may desire to appoint wishes to see that evidence, it is in Denver at the present time.

As far as the ruling of the National Association of Dental Faculties is concerned, we have great respect for the resolution which Dr. Patterson presented two years ago, in which he requested that a four years' high-school course be required for entrance to the dental schools. This resolution, as it came before that body, was so touched up and readjusted to meet the demands of the schools that were weak that it stands today in such shape as to have no meaning, and is of no effect.

Dr. Patterson. It has been said that the essayist could substantiate the statements that have been called in question. I demand that that last statement of the speaker be substantiated.

Dr. Millberry. We have the proceedings of the National Association of Dental Faculties for 1908, at which time the resolution of Dr. Patterson was introduced. These resolutions, I understand, are not acted upon until the following year. The proceedings for 1909 are here and it can be shown in them that the four years' high-school course has been limited. The word "accredited" stands alone, and "accredited" in the state of California means accredited by the University of California. We can show that some of the schools of California admit students on two years' high-school work.

Dr. Patterson. As long as I arose for information, I would ask the speaker to look after his own state. The fact of the matter is that there was no idea in the Faculties association to do anything else but accept my resolution offered two years ago. But in some states there is no four years' high-school course, the course being limited to three years. In the speaker's own state the course is four years, and so it is now in ours. Wherever the four years' high-school course is given, it is demanded for admission to dental colleges, but when an accredited high-school course comprises three years, as it does in some states, it is accepted for admission. We did all we could to secure unanimity with the majority, and when the speaker says this was a subterfuge and really did not amount to anything at all, I demand a correction of that statement.

Dr. Millberry. I did not apply the word subterfuge at all. I merely said what the essayist had originally stated, that the National Association of Dental Faculties is not in position to sustain its own rulings. It has not done so in California.

Dr. Patterson. Why didn't it? Let us know!

Dr. Millberry. In regard to the appointment of regents of the university, they are not elected, nor are they obliged to go into politics to secure their positions. They are appointed by the governor and confirmed by the senate of

California, and they represent the best men in the state.

I would further call your attention to the report of the Committee upon the Address of the President, and quote some expressions from their report:

> Your committee is in hearty sympathy and accord with the position of your President with respect to the fundamental principles upon which dental education rests.
>
> By no means is our present system of dental education perfect.
>
> It is manifestly true that in the special department of education with which we are immediately concerned there is crying need for reform.
>
> —to justify us in proceeding with what we should regard as our clear duty to correct such abuses in dental education as lead to the licensing of incompetent practitioners.

This report, I understand, was adopted by this body this morning; if so, these recommendations ought to go into effect.

Dr. Truman W. Brophy, Chicago, Ill. I have been a member of this association from its origin, and also a member of the American Association preceding it, dating back to 1872, and can say from experience, if you want to get up a little excitement and desire to produce a warm discussion among the members, just introduce the subject of dental education and you will get it. We have here some of the very best men in the world engaged in educational work, and I believe, as I always have believed, whenever such contentions exist in the discussion they are due to a lack of perfect understanding among the speakers of what is really required.

The question then arises: Are the dental educators of the United States honest men? Are the dental educators of the United States doing what they can to advance the interests of dental education? Are they honest in their declaration that they are trying to do better than in the past? If so, then we should stand together, for there is strength in union.

If there is any man here graduated from Harvard University with the degree of A.B., he knows what that means. While crossing the ocean three years ago I met a gentlemen who was graduated from Harvard forty years ago, and he said that the accredited high school—somebody took exception to the word "accredited"—of the United States today gives its graduates a better education than was given in Harvard University forty years ago when the degree of A.B. was conferred. In other words, the recipient of an A.B. degree in Harvard forty years ago had not as good an education as the graduate of the accredited high school in the United States today. Is there anyone here who doubts that a man who was graduated from Harvard forty years ago was not fitted to enter a professional school of medicine or dentistry?

If not, then you must be willing to admit that the man who is graduated from the accredited high school in the United States today is fitted to enter our institutions of dental learning.

Some schools, according to the reports in the journals, are in a deplorable state, and their educational work is so poorly conducted that in the interests of education and humanity these schools should be closed. But there are many among the professional schools of the United States today that are going on and doing better work; they have as good standing as, and are educating their graduates better than the schools of the National Association of Dental Faculties.

It is easy enough to find fault. It is

easy enough to declare that men should be better. We all know they should be better, but how are you going to improve them? Would it not be a great deal better if the men who are finding fault would come forward and suggest the remedy and take hold of the work.

There is the Institute of Dental Pedagogics, an institution in dental educational work which is raising the standard and will continue to do so, in spite of all opposition and faultfinding that it may be subjected to.

How do the schools of dentistry stand abroad? Are there any other professional schools in the United States whose graduates hold such high positions throughout the world as graduates of our schools of dentistry are holding today, and have held for half a century? No. Every dentist who has visited foreign countries feels proud of the fact that our institutions of learning stand high there, and our graduates hold positions of honor.

In a conference a few nights ago in our society at Chicago, Dr. G. V. Black made the statement that the number of graduates from the dental schools today is not equal to the demands of the people. That same statement was made today by his colleague, Dr. Koch. What are you going to do in view of that situation? Are you going to demand requirements so high that there will not be a sufficient number of students to supply the demand? Who questions that a graduate from a high school is an educated man? No one. We must use some common sense in dealing with this matter and have our men educated so that they are fitted to comprehend the studies of the curriculum. The necessities of humanity must be subserved, and there is an honest effort on the part of the schools of this country to fit the young man to be, as one of the greatest state board examiners has declared to me, a good, honest, safe, reliable, dental practitioner.

In the city of Chicago there are 400,000 children. We are attempting to give dental care to these children, and to provide free dental service for those who are unable to pay for it. How many dentists do you suppose will be required to care for 400,000 children? There are not dentists enough in the states of Illinois, Wisconsin, Iowa, and Missouri to do it. That is the proposition which confronts us today. The children in these congested cities must be taken care of. The address delivered last night by the distinguished gentleman—Dr. Evans—who has looked deeply into this subject, has set a mark for us, and everyone who heard his remarks will go home with the feeling that he has a work to perform which he can never complete, but that he must do his best not only to educate the people as to their needs, but to educate the young men and to assist to the best of his ability in preparing others to help in that great work, which he will never be able to accomplish in his own way or in the way in which the members of our profession have been attempting to accomplish it in the years gone by.

Dr. Charles E. Post, San Francisco, Cal. Dr. Sharp, when he told me that he was going to read a paper here, said that he would "probably be ripped up the back," and he has not been disappointed in his expectations. Dr. Sharp is absolutely honest in his statements, and has the courage of his convictions, as Dr. Millberry said. I, like Dr. Butler, am not connected with any college, except in that I am on the clinical staff of one, and go there once or twice a year. Dr. Koch stated that perhaps Dr. Sharp's

horizon was confined by the limitations of the Golden Gate. That is not necessarily so. Naturally Dr. Sharp is more conversant with educational affairs in his own state, as is Dr. Koch with those in his state. But our horizon is not so confined that we have not been able to look over it into Illinois and see so-called colleges there selling diplomas in Germany and other foreign countries, a blot which I am glad to say has now been wiped out.

We are quite proud of our state, and Dr. Sharp's object in reading this paper is to make a plea for a higher standard of dental education. He tells you what his college is doing in California. Its faculty has no control of the financial affairs of the college whatever. The control of these is in the hands of the board of regents of the state university.

Of course, there are other colleges that have the same administration.

The essayist's paper simply shows that he is disinterested and honest in his desire to have the standard of preliminary education raised. It was written with the hope that from this body a committee might be appointed to investigate the preliminary educational requirements of the colleges, and to see if all are living up to the standard set by the National Association of Dental Faculties, and also if through the National Dental Association the standard of preliminary education cannot be raised.

Dr. Brophy. The remark of the last speaker would suggest that there has been an endowment.

Dr. Post. There is no endowment.

Dr. Brophy. The dental colleges of the United States are not endowed, except the college of Harvard, which I understand has an endowment of $25,000. The only way in which they are supported is through the medium of fees paid by the students—and whatever might be said as to a higher standard of the universities, they will depend upon how much money they receive from the students.

Dr. Richard Summa, St. Louis, Mo. I hesitated to take the floor until Dr. Brophy made a statement which I would like to correct. I am connected with one of the state universities. At present we receive the salary that is allowed us, whether we have one student or ten. We have nothing to do with the fees, which are jointly contributed from all departments. We are not dependent upon the dental department fees.

I am sorry that a feeling of anger has entered into this discussion. One of the gentlemen in his heated remarks went a little too far in stating that the schools which went out of the Faculties association did so because they could not live up to the standard. That, to the best of my information and personal knowledge, is not true of the school which I represent. We went out because we could not come up to the fee. We are an integral part of the state university, and we are limited in fees because the citizens of the state are taxed for the support of that institution. As far as the dental curriculum is concerned, there was, I think, no trouble in that respect; if there has been any, I would be glad to learn of it.

Dr. Patterson. I did not specify what the dereliction was, and I did not refer to your school, but I have the papers which substantiate my claims.

Dr. Summa. I merely spoke on behalf of this one school. I believe that we are all a unit in that we would like to see dentistry improved. It has been stated in the President's address that dentistry is an American profession. We are all proud of the fact that it has become a

great profession in America, although the stomatological movement has tended to detract from its merits.

In order to improve the dental curriculum we must improve the preliminary training, and that has been accepted by a great many schools. There are some schools which cannot come up to that preliminary standard, because they have no four years' accredited high-school courses.

I deplore this condition very much, and have been trying to think out some scheme by which the difficulty might be overcome, but up to the present moment I do not know how it can be done. Can a state which demands a four years' preliminary high-school course of the students come down to three years? Can such a state allow a student to go to another state that requires only a three years' course, take that course, and come back to his home state and be recognized? Can the student who graduates from a school requiring only three years' preliminary training be recognized by the examiners?

Dr. Gray. That is not the regulation of the Faculties association. Only applicants whose high-school training is accepted by a dental college can enter that college, so that, for instance, a student applying to the Vanderbilt University from Illinois could be compelled to furnish a certificate of a high-school course of four years.

Dr. Patterson. That is the rule, as it works out.

Dr. Summa. I confess that I fail to recognize the advantage of this rule. I would ask this body to support every honest movement toward the improvement of dental education. We have many talented and honest men on the examining boards, but we also know that a good many men have been put on these boards who lacked the necessary qualifications. The average dentist, when appointed on a board, cannot expect that in four weeks' time he will be able to ask intelligent questions upon scientific subjects. I hope that some day the men called upon to examine our students will have had some particular training for it, and I think every one of you will agree with me in this.

Dr. Sharp (closing the discussion). Now that the gentlemen of the National Association of Dental Faculties have finished discussing me, it would be well to return to a discussion of the subject of my paper, which deals with dental education. The question which has arisen here is: Can the National Association of Dental Faculties control its members in accordance with its rule? I state that I have evidence to show that it does not or cannot.

Dr. Patterson. Why didn't you tell us that?

Dr. Sharp. That question is merely a contention in favor of my argument that you do not, or at least cannot—as you have no means of knowing what the schools are doing.

Dr. Patterson. We claim that we do, and you claim that we do not; that is where it stands. You did not bring the proof. I told you to bring the proof.

Dr. Sharp. We have the proof in Denver, but not in my pocket. The entire contention on this point in my paper was based on the analysis of the rules of the National Association of Dental Faculties, not as applying to any one school, or anything of the sort; it was just this one point: Can they enforce the rules of their association? One gentleman here says that all schools are doing good work. Aside from my own

knowledge of conditions, I have had possibly twenty dentists in this city say to me that many of the schools were rotten to the core, many of these being members of the National Association of Dental Faculties.

Dr. PATTERSON. Why don't you name them?

Dr. SHARP. It is unnecessary. I have the evidence to show that such a possibility exists. You come here and abuse me; Dr. Holly Smith did not undertake to answer one word of my paper in his remarks, which were merely abusive. I have brought these proofs to Denver to show them to this association, and, Mr. Chairman, if you will appoint a committee to investigate them, I shall give them to you with the greatest pleasure, as I have brought them here for the benefit of our profession and of the people of our country.

As far as placing the control of dental education in the hands of the "new dental faculties association" is concerned, I never mentioned anything of the sort, but I did recommend the putting of this control into the hands of the higher institutions of learning, the properly standardized universities, and beyond the hands of the dental college faculties. This we have done in our own school. Our faculty, in justice to a worthy calling, has given away its property, has given control over it to some higher educational institution; this we were anxious and willing to do. We have anywhere from $25,000 to $50,000 worth of property, which our faculty as a whole gave to our state university for the benefit of the people of our state.

I ask, Will all the colleges of this country do likewise? Will they place the control of their faculties into the hands of the standardized institutions that should and do, with few exceptions, stand for higher education? This is what I appeal for, and these are my answers to the remarks of these gentlemen.

Dr. M. EVANGELINE JORDON, San Francisco, Cal., then read a paper entitled "Preventive Dentistry for Children," as follows:

Preventive Dentistry for Children.

By M. EVANGELINE JORDON.

WHEN the laity begin to comprehend that caries of the teeth, the disease most prevalent in the world—indeed, in the opinion of students, one of the chief causes of the great white plague—is *preventable* but not *curable*, they will demand prevention rather than repair.

While the advocates of prophylaxis have the right idea, they do not begin to care for the children soon enough. I do not wish to be misunderstood in making this statement. I do not regard it as wholly the fault of the dentist, but the result of the prevailing idea that "The deciduous teeth are soon to be lost, so why waste time upon them?" which is shared by the physicians and laity in common.

PREVENTION AS THE DENTAL IDEAL.

While a certain number of the dental profession have been working slowly toward prevention, the great army are still pursuing the construction of bridges and inlays—most beautiful and serviceable, I grant—to restore the already broken-down teeth, and in this they are following the practice begun two thousand years before Christ. A greater portion of the time of colleges and dental associations is also occupied, I am sorry to say, with the teaching of the improved methods in constructing these substitutes—these institutions, in their eagerness to grasp the physics of proper occlusion, overlooking the great underlying principle of the physiology of prevention. I venture to predict that twenty-five years from today the demands of intelligent people will not be for bridges and inlays, but for perfect teeth preserved by the most careful watchfulness, beginning with the first appearance of the deciduous teeth; and we as a profession must meet this demand, if we do not help in creating it.

CHILDREN'S DISEASES OF DENTAL ORIGIN.

For the last few years, as he has seen one piece after another of his carefully built work fail, the thoughtful dentist has been asking himself why children's teeth are irregular, necessitating painful weeks or months of labor to give the child a masticating apparatus with perfect occlusion and to restore a facial contour more nearly normal. Why are children so frequently heard to complain of toothache? Why do they have so-called gumboils, or swollen faces? Why do the mothers complain, "Johnnie just *will* bolt his food," while the family physician is seeking for the cause of Johnnie's stomach trouble? Why are there so many nervous children? Why are children having trouble with their eyes, ears, and tonsils? Why are they so susceptible to disease?

One of the answers to which I most earnestly call your attention, is—*the teeth.* Look into their mouths—not at their tongues, as did the doctor of our childhood, utterly blind to the other conditions, but look with open eyes at the teeth!

It is not always possible for an untrained eye to discover pathological conditions of the teeth, as the following case will prove:

Case I. The mother of a little girl of five wished to have the child's mouth examined and the teeth cleaned, but said she could not see anything wrong. The day of the appointment she telephoned that the little girl was sick in bed with a fever, thought to be due to stomach trouble. A few days later she appeared. The lower left second molar had a tiny black spot in the fissure, but examination disclosed a pus sac, hidden by the tongue, on the lingual surface of the mandible. Four sittings of fifteen minutes each sufficed for healing the abscess, filling the roots, and completing the case with a copper amalgam filling, and during that one hour the lower molars on the other side were filled and the teeth cleaned and polished.

Think of the suffering that might have been saved!

ASCERTAINING THE PHYSIOLOGIC CAUSES FOR DENTAL CARIES IN CHILDREN.

In studying the causes of caries in children's mouths it is often necessary to go back at least a generation into the history of their parents, to discover, if possible, the following data: Whether there is any hereditary disease, whether the parents were very young or very old —the most robust children being born

when the mother is between twenty-two and twenty-five years old and the sum of the parents' ages is under seventy.

Conditions during gestation. What was the mother's condition during gestation? Was her health good? Did she overwork? We find great variations among the poor people in this respect. No matter how poor a Jewish family may be, the pregnant mother is an object of care and solicitude, and we find, as the result of this and of the fact that she nurses her child, that the teeth of the poor Jews are much better than those of people of other nationalities.

Too rapid succession of gestation. Does the mother bear her children too rapidly? Strangely enough, two cases were brought to me within the same week which I think illustrate this point:

Case II. The first of these cases was that of a little boy of three, the third child in a family of wealth, born fourteen months after his sister. His teeth showed a breaking down, although there was a history of good health from birth. The cusps of the molars were defective, the canines pitted, and there was an irregularity, namely, protrusion of the mandible.

Case III. This case was that of a little girl, the youngest of three children in a family of means, born fourteen months after the second child. I saw her when she was one year old. The upper incisors were badly stained, and she had a pronounced protrusion of the mandible.

Bottle feeding. If the conditions up to birth have been good, then inquire into the history of the first year. Was the child nursed or bottle-fed? Here a large signal of danger should be held up. The Gail Borden "Eagle" brand of condensed milk, unless carefully modified with lime-water, causes an early breaking down of the teeth, and sometimes the lime-water does not save them.

Case IV. A little boy, two years and nine months old, raised on condensed milk, was brought to me with the pulps of the upper centrals dead and discharging pus from labial sinuses; all of the first molars and one of the second molars were badly broken down. The health of the child had suffered severely from the pus that was being mixed with his food and taken up directly by the circulation, and from his inability to properly masticate. I treated the incisors until the pus had disappeared and the sinuses had healed, then filled the root-canals and the teeth, filling the cavities in the molars in the meanwhile. I saw the child three months later but hardly knew him, as he had grown remarkably in health and size.

Case V. The patient, a little girl, three years and three months old, had been raised on condensed milk. During the past year her mother had taken her to several dentists, but no one would undertake the work, as the child had a bad temper. The history before and since birth was good. For the last year she had at times been given a tonic. The condition of the mouth disclosed three upper incisors and the lower first molars discharging pus. There were other carious teeth. The child's mother was a nervous wreck, as the consequence, she said, of the capricious temper of the little girl, so the frail old grandmother brought the child every other day for a month. The child had been suffering for over a year, and many of her teeth were broken down nearly to the gum. There could be no question of extracting them, because of the loss of space that would ensue for the permanent teeth and the resulting deformity of her face. She was too young and physically in no condition to reason with, so we did the work by force. She is unusually large and strong for her age, and her grandmother and I would be exhausted at the end of a twenty-minutes' sitting. I might have made the sittings shorter, but her parents lived in a neighboring town and she had to be kept in Los Angeles for the work. The alveolar process was necrosed so that in five places it was necessary to lance and pack the sinuses with cotton threads dipped in dilute sulfuric acid. This work cannot be done painlessly, but at no time did I let the child leave the office until she stopped crying and promised to be better the

next time. I generally had some little bottle or box for her to carry away as a consolation.

I can cite many other cases of children between the ages of three and four suffering because of improperly prepared bottle food.

Malnutrition in consequence of disease. If the child has safely passed infancy, let us explore farther into the wide field of the causes of caries. Malnutrition sufficient to cause the breaking down of the deciduous teeth may result from any of the following disturbances: Adenoids, enlarged tonsils, need of circumcision, chronic constipation, or some of the diseases of childhood—whooping-cough, measles, or scarlet fever.

Faulty daily diet. All of the above conditions being eliminated, we are led to question about the daily diet of the child. In so intelligent a nation as the Americans claim to be, the feeding of the young of their race must be the exception to the general rule of their good sense. After a child has all its teeth and is able to run about, the mother seems to feel that her duty ends. The truth is that she has only led her child to the gateway of the path, neither straight nor narrow, that leads to good health and a sound constitution. The susceptibility to caries increases from that time up to puberty, and during all that period teeth are erupting that are to equip the child with the most wonderful of human machines, upon the continued good service of which depend the health and length of life of the individual. On looking into the mouth of the average child at the age of six and one-half years we find the first permanent molars partially erupted. They are not far enough above the gum to take an active part in mastication, consequently the fissures are loaded with a thick coating of decomposed starches. When this is removed, we may or may not find the beginnings of caries in the fissures, but in a large percentage of cases we find small buccal cavities on the lower molars. The brush never seems to reach these points. A look at the deciduous teeth discloses exposed or dead pulps in some of the first molars, and cavities in the other teeth. In what respect is diet accountable for such conditions? Mush, ever indigestible, heavily sweetened and ready to ferment, and perhaps a doughnut, for breakfast are part of the child's diet. His appetite being poor, he is given a cup of coffee to induce him to eat. Not having made a good breakfast, he is given a nickel to get something at recess. When he goes to the corner grocery, equally as dangerous to the health of the nation as the grogshop that occupied that location a quarter of a century ago, his abused stomach rebels at food, and he gets a nice long green pickle, highly colored with alum, or some of the cheap anilin-dyed candy. A luncheon consisting of meat, mashed potatoes, the soft part of fresh white bread, and a sweet dessert, is hastily bolted so that the child may return to play. After school, more candy and doughnuts or ginger-snaps follow. Dinner repeats luncheon, and the specially petted children go to bed hugging a box of candy. Is my picture overdrawn? Think of the children in families in comfortable circumstances and ask yourself. What is the result of this? Not having proper exercise, neither the teeth nor the jaws are properly developed. The gums, not having the friction of coarse food, become turgid and flabby, and are a menace to each newly erupted tooth. Is it surprising that the permanent teeth erupting into such a hotbed of

corruption are the victims of the millions of bacteria, which have no difficulty in reaching the large pulps and causing their destruction before the root formation is completed?

THE DURATION OF FILLINGS IN DECIDUOUS TEETH.

It seems to me that we have been groping in a dark fog of ignorance when we ourselves have considered the deciduous teeth short-lived. Let us see how short-lived they are.

Case VI. A little girl, four years and three months old, required twenty fillings. At that age her centrals should last at least two years, the laterals three years, the first molars and lower canines four years, and her second molars and upper canines from six to seven years.

Case VII. A little boy of five and one-half years required twenty-two fillings.

Case VIII. A little girl of six and one-half years required twenty-three fillings.

In each of these cases I had to remove pulps or treat root-canals in one or more teeth.

I could cite dozens of cases ranging from three and one-half to six and one-half years in which the average was ten fillings and from one to three root treatments.

Case IX—Is an extreme case—that of a little boy, twenty-two months old, for whom I filled the lower first molars and two upper incisors. His molars should remain eight or nine years.

I believe the average life of a filling in a permanent tooth is said to be about four years. Take the average child of three and one-half years, and it needs two or more fillings in the molars, which must be in active service for six or seven years. Do you call that short-lived? It requires fillings that must remain longer than the average filling in a permanent tooth. In a child of six and one-half years—with these no doubt more of you are familiar, this being generally considered quite an early period for bringing a child to a dentist—the first deciduous molars are to last three years, yet you find them broken down to the gums, with the roots suppurating. If they are removed the jaw will not develop, and regulation will be necessary for proper occlusion, or, if they are neglected, malnutrition may result from swallowing pus and from imperfect mastication. The second molars and upper canines, on the other hand, remain five years. Do you call that short-lived? And yet some dentists still say, "Oh, let them go, they'll soon be lost!" Do they ever ask themselves, How soon?

THE MANAGEMENT AND TREATMENT OF CHILDREN IN THE DENTAL OFFICE.

The management and treatment of children in the office is very different from that of adults, and must be so if we are to obtain favorable results. I believe that this work cannot be so successfully carried on in general practice. It requires less dental equipment and less awe-inspiring apparatus in sight. Owing to the fact that children are more used to women, women will generally succeed better with them. The entertaining of the children so that the desire to return will outweigh the remembrance of necessary pain, is an art best acquired in a kindergarten.

TIME OF SITTINGS.

When a child comes for treatment with several cavities in his teeth—and, unfortunately, it is an exception for a child

to have only one or two—the work must not be undertaken in too light a manner. The tiniest cavity may disclose an exposed or dead pulp, and it is only fair to the parent that it should be explained that the work will require considerable time if the child is not to be frightened or hurt, and the work is to be done in the best manner. It is never wise to do much at the first sitting. Appointments for little children should be very short. I seldom work longer than half an hour for a child under five, and many of my sittings do not exceed fifteen or twenty minutes.

CLEANING THE TEETH AND TEACHING DENTAL TOILET.

Cleaning the teeth occupies part of each of the first two sittings, unless the child is in pain, when I spend the time in bringing relief to the little sufferer. Cleaning often requires longer than two sittings, if the stains are deep and the functions of the alimentary canal are deranged. Each time I paint the teeth and gums with iodin, allowing the child to see, from the stain, where the brush is failing to do its work. At the first sitting I give minute instructions as to the use of the tooth-brushes, powder, dental floss, and milk of magnesia, if indicated, and throughout the work I watch to see if the instructions are being carried out. In two or three weeks the habit of proper care is begun.

One word as to the use of the tooth-brush. The followers of prophylaxis have taught me the value of always using the brush dry, and the Chinese have taught me the value of cleaning the tongue; these lessons, added to our present knowledge, if persisted in, will keep the mouth clean. Nothing keeps the gums in so healthy a state as the preliminary brushing with the dry brush. I worked for a little girl of eight who was so anxious to keep her teeth clean that she had brushed back the festoons of the gum, and already had a cervical cavity in one of her centrals. If only some great fire would burn up all the straight brushes in the world! Is it our fault that most people use them?

FILLING MATERIALS FOR DECIDUOUS TEETH.

As to materials used in filling deciduous teeth, the cements and copper amalgam suffice. Too much cannot be said against the use of silver-tin amalgam in *any* tooth in a child's mouth. It cannot be used successfully in the deciduous molars, because in ninety per cent. of the cases it has to be replaced—first, because, if too near the pulp it causes its death and necessitates the cure of an abscess, and second, because in smaller cavities there is a recurrence of caries around the filling.

In the permanent first molars silver-tin amalgam is also contra-indicated, first, because childhood is the period of greatest susceptibility to caries, second, because it is not easy to apply the rubber dam, and if the rubber dam is not used the possibility of success with amalgam is lessened, and third, when the child is grown the first molar, which was so far back in the tiny mouth, is near the front and the amalgam-stained cusps are in plain view.

USE OF THE RUBBER DAM CONTRA-INDICATED.

It is never good policy, and it is seldom possible, to use the rubber dam with chil-

dren. The deciduous teeth are too constricted at the necks to permit a dam to protect a large approximal cavity, and such cavities are in the majority. Knowing, then, that we must depend upon napkins and cotton rolls, we must use materials that do not require absolute dryness for a long period.

Copper amalgam. Copper amalgam has only two faults aside from its color, which is of no great purport in the deciduous teeth. It can be put in under water and give remarkably good results. It needs very little retention, and has an excellent effect upon tooth structure. The objections are that it sets so slowly that nothing hard may be eaten on the same day, and that, in time, it wears down. Notwithstanding these objections, nothing will save so many teeth with so little effort as copper amalgam. I am surprised to find no mention of its use in some of the books on operative dentistry. Copper cement is most excellent for deciduous molars with large approximal cavities too sensitive to allow the cutting of retention pits and grooves. If the cavity can be sufficiently dried and heat is applied to harden the filling, the result is often very good.

ARSENOUS OXID FOR DEVITALIZING PULPS.

So far I have failed to find in our literature an allusion to exposed pulps in the deciduous teeth, and yet over one-eighth of the teeth we are called upon to fill present exposures. No one seems willing to come out and say, "Use arsenic," and still nobody can produce a substitute that will do the work so quickly or so painlessly. The market has been flooded with mummifiers and pulp cappers, but not one of them meets the requirements. After years of experimenting, I came to the conclusion that arsenous oxid is the best and safest drug to use. Pressure anesthesia is often successful, but as the dam cannot be applied, cocain may come in contact with the gums, or the bacteria in the cavity, which cannot be sterilized, may be carried into the root-canals with the cocain. Either will produce an inflammation which lasts two or three days.

The technique of using arsenic is as follows: The cavity is washed out and the pulp depleted. If there is a history of pain at night, a dressing of carbolized resin is inserted for a day or two. When the pulp is ready for devitalization, an amount of the S. S. White arsenic paste smaller than a tiny pinhead is mixed into a cream with twice as much cocain and Black's "1, 2, 3." If possible, this is applied with a broach directly to the pulp. If the exposure is small and the tooth sensitive, a pellet of cotton of the size of a small pinhead is dipped in the mixture and applied. Before applying, the cement should be ready to mix, then cotton rolls or a napkin, and the saliva ejector, are adjusted and the attention of the child is further secured by beginning to tell a story. The arsenic is inserted, then cotton enough to half fill the cavity, which is sealed with cement, care being taken to fill the cervical margin and to pack the cement against the adjacent tooth with the first movement. If the operator has any fears, he may paint the gum with iodin after the filling is in place, or, if the cervical wall of the treated tooth is badly broken down, paint and dry the gums before applying the arsenic. The dressing is left in the cavity twenty-four hours *only,* then the cavity is opened and thoroughly washed. With a few cuts of a large round bur the margins and the cavity are cleaned and then washed thoroughly before removing the

pulp. With a sterile bur the pulp-chamber is cut into and the pulp amputated. The cavity is dried and then dressed with Black's "1, 2, 3," and sealed with gutta-percha, which is left two or three days. Then the pulp-chamber is filled with modified Söderberg's paste, *i.e.* equal parts of alum, glycerol, and thymol, made into a paste with precipitated calcium phosphate. The prescription for Söderberg's paste contains zinc oxid; as this may contain a trace of arsenic, precipitate of calcium phosphate has been substituted. Seal with gutta-percha for two or three days, then part of the gutta-percha is trimmed out, and the cavity is filled with copper amalgam. No broach should ever be used in the root-canals. The roots are in all likelihood partially resorbed, and a great deal of injury may be done to the resorptive organ. For years I have watched the effect of this paste upon the resorptive organ, and cannot find that the paste in any way hinders its natural action and the shedding of the teeth. The mummifying pastes upon the market all seem to contain some formaldehyd, and those I tried caused pain and interfered with resorption. I pursue this method in all cases of exposure, no matter how young the child.

DIVERTING CHILDREN'S ATTENTION DURING DENTAL OPERATIONS.

Children under four years of age are very difficult to reason with, so it may be necessary to work without paying attention to their crying. In such cases I have the mother sit in the chair and hold the child, controlling its hands and feet. Then, after placing a heavy silver thimble upon the ring finger of my left hand, I prop open the jaws with it and support the head with the rest of the hand. At that age children may be amused with nursery tales like "The Little Red Hen," or "Goldilocks and the Three Bears," but they are too young to appreciate rhymes.

All sorts of devices are necessary for diverting children's attention during the operations. One of my most successful ones is a large assortment of celluloid dolls and animals, all named, that apparently swim around in the revolving bowl of my Clark cuspidor. If there is much work to be done, I do not bring out all the dolls on the first day. All little kindergartners like the naming of instruments; so, for instance, compressed air is "North Wind," the hot-air syringe is "South Wind," dental burs are "Busy Bees" that buzz in the mouth, and the saliva ejector is the "Water Birdie" that sings a song as it keeps the mouth dry. A successful children's dentist must have a stock of stories, prose or verse, with which he is so familiar that he can recite them without any mental effort. Silence with children is fatal. It gives their imagination a chance to pile up horrors. In treating these patients from the age of four until the time when childhood is left behind, nothing is of greater assistance than the operator's voice in reciting anything with a rhythm. It diverts the child's mind from the work in hand, evens his salivary flow, and keeps his tongue more stationary.

For a moment please consider yourself in my chair!—

A wonderful Funnyland sight
Is a mountain of marvelous height;
    But you never could guess
    What happens, unless
You were there upon Saturday night.

When the sun in the west is aglow,
The whole mountain rumbles, and lo!
    It pours out a stream
    Of assorted ice cream,
By the banks where the macaroons grow.

Then from city and country and town
The children of king and of clown
All run with their spoons,
And they pick macaroons,
And they eat, till they have to lie down.

But the thing that the children adore
Is a mountain that stands by the shore,
With a cratery pot
Where molasses keeps hot,
With trickles of taffy galore.

Sometimes it rains popcorn at night,
And all of the kernels that light
On the mountain top, pop,
And they hop, and they drop,
Till the top of the mountain is white,
And the corn balls roll down
To the edge of the town,
While the children dance round with delight.
—*Albert W. Smith.*

Did you notice how still you sat during that recital? Children sit as still. The entire attention of the child can be held, so that the arsenic treatment or a cement filling can be finished, and the child is unconscious of the passage of time.

EDUCATING CHILDREN'S DENTISTS.

You who have daughters or sisters desirous of entering our profession, have them fitted as kindergarten teachers! Then, after they have learned how to manage the little folks, send them to dental college. When they are prepared to begin their life-work, let each one take up the practice of preventive dentistry and do children's work for, perhaps, five or six offices. You will then be in a position to meet a growing demand, save yourself valuable time and much trouble, and still do justice to the little ones.

PLEA FOR EARLY PRESERVATION OF CHILDREN'S TEETH.

People do not properly value their teeth. Because of the skilful art of the dentist applied for restoring them to usefulness, people forget to appreciate their teeth when they are not causing any trouble.

Our Creator did not have the dentists in mind when he firmly embedded over two-thirds of the length of the tooth, deciduous or permanent, in a bony case. Did He think a branch of the profession would arise for the practice of extraction! The teeth were intended to remain for life in the mouth of civilized man, just as they do in savage races, and it is a blot upon civilization that, in proportion to its advancement, the teeth of the people retrograde.

Should we not go back to nature and live plainer lives? Should we not reach the cause of this decadence in the teeth and begin their salvation in time. Upon us of the dental profession rests the preservation or degeneracy of the teeth of the future generations. Why, then, shall we wait until the teeth begin to decay? Is this not like locking the stable door after the horse is stolen? Don't wait until the child is five years of age! It is then often too late. Malnutrition may already have deformed the developing teeth, or, if they have escaped, may have so undermined the constitution that it is greatly impaired. How long could such little victims withstand the ravages of measles or that dread disease, scarlet fever. Alas! too often little graves, wept over by mourning parents, are silent witnesses to appalling neglect.

"PREVENTION" THE WATCHWORD OF MODERN DENTISTRY.

In conclusion, let us add to the good work that already has been accomplished in the *restoration* of teeth—work that will ever demand exhaustive research as to the best methods available for that

purpose; let us devote, I most earnestly entreat you, our hearty co-operation and support to *preventing* caries and premature loss of deciduous teeth! This is an imperative demand of this age of progress, this age of the specialist in every field of material activity and growth.

Should we not, because of this demand, adopt "prevention" as our watchword, and thus be enabled to carry triumphantly, to the uttermost heights of professional achievement, the lilac banner of comprehensive and perfected dentistry?

Discussion.

Dr. Ray D. Robinson, Los Angeles, Cal. Five years ago, in the heat of a discussion during a faculty meeting, I made the statement that I did not believe any woman had a place in dentistry. After having observed Dr. Jordon's work in her office for the last year or more, I want to publicly retract that statement. I have been in few dental offices where more good is being done for the patients and the public than in Dr. Jordon's office from day to day. That is a strong statement, but I believe it is true. As an economic problem, I believe if children were put under the care of Dr. Jordon or someone equally as efficient for the first fourteen years of their lives, and formed habits according to her teachings for the rest of their lives, but a very small percentage of them would ever need any further dental care. If they do not receive such able instructions, and if their deciduous teeth and their permanent teeth as they erupt are not so ably cared for, they are going to need dental care all their lives. So, from the standpoint of economics, and considering merely the feature of conservation, Dr. Jordon's work is paramount.

There are one or two items in this paper to which I wish to take exception, however. It would be very difficult to convince me that it is proper to seal arsenic into the cavity of a tooth the roots of which are partially or wholly resorbed. It seems to work well in Dr. Jordon's practice, but I should hesitate long before doing it. Children are hard to control. If one could always be sure of their returning within twenty-four hours, the maximum period for which, as the essayist has recognized, the arsenic should be left in the cavity, it might be all right, or at least it might not cause any trouble. But how can one know whether a child is going to come back within twenty-four hours?

I know of one instance in Dr. Jordon's practice, that of a child of about four years of age, with five abscessed teeth from which pus was discharging into the mouth. From such abscesses a large quantity of pus is discharged within twenty-four hours, and a child of four having very little resisting power, it is evident that the proper correction of the trouble not only saved the child from serious illness, but possibly from death.

Dr. Brophy has made the statement here that there are not enough dentists in the four states of the middle West to care for the children alone of the city of Chicago, not to speak of the adults. This will serve to show you in a greater measure the importance of the work that Dr. Jordon is taking up and carrying on so well.

The preservation of the mesio-distal diameter of the deciduous teeth, of which Dr. Jordon spoke, is also of great importance. I have practiced the profession of orthodontia for a great many years, and I want to say that if all children during their first few years of life

had the care indicated by the essayist, we orthodontists would have to go out of practice, for the destruction of the mesio-distal diameter of deciduous teeth is probably the most prolific cause of malocclusion of the permanent teeth.

The work of oral hygiene, the history of which we listened to last night, and work such as Dr. Jordon's, I believe, are going to open up a new era in our profession—to inaugurate a new and more scientific dentistry.

It would be bold, indeed, of me to say that artistic dentistry has reached its zenith. I do not believe it has; but it is probably approaching it. We are, however, working in the wrong direction if we confine ourselves entirely to artistic corrective dentistry. Preventive dentistry is scientific dentistry, and this will and must be the dentistry of the future. We Americans think we are the greatest dentists of the world. Possibly we are, or we have been in the past; but the Germans are taking up scientific dentistry with such universal zeal that we will have to look well to our laurels if we would continue to stand in the forefront, and not be relegated to a secondary position in this field.

Dr. Celia Rich, Nashville, Tenn. A great philosopher has said, "The child is father to the man," and this is a true saying in senses other, perhaps, than were originally meant by its author. Each separate part of the child is indeed the parent of the same organ in the mature individual. The teeth offer no exception to the rule.

It would seem, then, that argument as to the necessity of care of the mouths of children would be almost superfluous. Such a paper as Dr. Jordon's, however, deeply thought out and comprehensive as it is, cannot but stimulate interest and lead to better care of the deciduous teeth.

The excellence of Dr. Jordon's paper is in itself a sufficient argument to prove the advisability of specialization in the treatment of children's teeth.

The more strictly practical parts of the paper interested me most as a general practitioner, and while I heartily indorse most of what has been said, I wish to express an opinion contrary to some of Dr. Jordon's practices.

The care with which she treats abscess sinuses, so often disregarded because not attended with pain, her tactful handling of her patient, her farsightedness in looking to the diet and environment of the teeth, deserve special commendation.

I, too, have observed marked improvement in the nervous and general physical condition of the child following circumcision and successful removal of adenoids, so that often a patient who had been quite unmanageable before became easy to handle after these operations. I deem it advisable in many cases to recommend these operations before attempting extensive work in the mouths of young children.

I cannot agree that silver-tin amalgams are always contra-indicated in these cases. As Dr. Robinson has said, the preservation of the mesio-distal diameter of the deciduous teeth is of paramount importance, and it seems to me that this condition cannot be successfully maintained with either of the materials advocated by Dr. Jordon, cement or copper amalgam, owing to the gradual washing away of these materials in the mouth. Amalgam is free from this objectionable feature. The difficulty of retaining these fillings, as well as their irritating effect on the pulps of the teeth, is undeniable. To obviate the latter a lining of cement

may be used. When proper preparation of the cavity for retaining a metallic filling is impracticable, gutta-percha is often the best material to be used. In a paper on the subject of preventive dentistry for children, gutta-percha surely has an important place. I know of no other means of so successfully restoring lost interproximal distances—if I may use this expression—as the insertion of properly constructed gutta-percha fillings. In these cases a single layer of the tough pink base-plate gutta-percha is first bridged across the space and adapted to the cervical walls of the two cavities. To obtain the best possible results a small piece of heavy gold plate of No. 26 or 28 gage is shaped so as to accurately bridge the space from the axial wall of one cavity to that of the other, and this is embedded in the material already in place, and the rest of the filling built upon it.

In the use of gutta-percha for filling children's teeth it is often necessary in deep cavities to first protect the pulp with a more rigid material, cement, as the "flow" of the gutta-percha under the stress of mastication will sometimes exert pressure upon this delicate organ, and give rise to serious pulpitis.

I must agree with Dr. Robinson and take issue with the essayist as to the use of arsenic in the deciduous teeth. I have never yet had the courage to apply it in one of these teeth, nor am I now convinced of its advisability. In the permanent teeth, where the greater density of pulp tissue as well as of the other tooth structures surely makes arsenous oxid more applicable, the erratic action of this drug, even when used in the minutest quantities, gives a warning which should not be disregarded. As far as irritation of the peridental structures is concerned, I regard the possibility of this as much more imminent and dangerous if arsenic is used than if cocain and similar local anesthetics are applied.

I judge from her statements that Dr. Jordon invariably removes the pulp when she finds it exposed in the deciduous teeth. Here again I would take issue with her. Although it is true, as she states, that the death of the pulp almost invariably follows closely upon its exposure, still, when the proper anodyne and antiseptic remedies are carefully applied with especial care to prevent pressure upon the pulp, and an easily removable filling material is inserted, the vitality of the organ can sometimes be preserved for some time. In the deciduous teeth, in which I believe with the loss of vitality of the pulp root-absorption also ceases, even a few months' gain is well worth while.

Dr. N. S. Hoff, Ann Arbor, Mich. I want to commend this paper, as its subject is of most vital importance to our profession. The technical features that have been already referred to, and the constitutional treatment of children which has been emphasized, make this paper most admirable, and I wish to congratulate Dr. Jordon on these features.

If we men, who are so rough and perhaps unintentionally cruel in our treatment of children, could only by reading and re-reading this paper assimilate its teachings, I think it would have the effect of causing us to be more considerate of the little ones who come into our care, and this would have the effect of getting them into a frame of mind in which they would be likely to come to us more willingly with their troubles, and we could have more influence over them.

The equipment of a modern dental office is alone sufficient to strike terror

to the mind of a timid child. In many offices a great crane overhanging the chair, with the dental engine attached to it, strikes terror to the heart of even a grown person, and certainly must have an even greater influence on a child. The dental chair, with all its levers and attachments, and even the fountain cuspidor with all its adornments, not to mention the modern cabinet, with its numerous attachments of switch boards, bur racks, etc.—all the varied paraphernalia complete the awe-inspiring appearance of the average dental office.

When are we going to get rid of these abominations? When shall we be able to throw away these infernal engines and appliances that inflict such torture?

We have heard a criticism this afternoon regarding the standard of education. The question was threshed over for hours, and a good deal of hard feeling engendered. This very paper is the keynote of the future of dentistry, and unless we dentists wake up to the fact that preventive dentistry is our profession and not repair dentistry, the women in the dental profession will lead us.

I believe in the care of children's teeth, not only in a prophylactic way by preventive means and by hygienic feeding, but also by education of the children and their parents in the proper care of the teeth. That is the field in which our profession must seek honor and glory in the future, not the construction of gold or porcelain inlays, or any other method of repair; and the sooner we come to a realization of this, the better it will be for us. If we could afford to let all old people suffer or send them to the extractors, we might devote our whole time and attention to the development of perfect teeth for future generations.

I am convinced that dental caries is not only a preventable disease, but that it is possible to preserve every tooth of the deciduous set until the time has arrived for its removal and replacement by the permanent set. This may be done without any considerable loss of tooth structure or recurrent caries.

If I could have twenty-five children placed in my absolute care, so that I could see them whenever I wished, and could overlook their diet systematically and scientifically, with the assistance of the orthodontist and the rhinologist for taking care of any possible abnormalities in their special departments, I would be willing to guarantee to the parents of those children that I would deliver them into their hands at the age of fourteen or sixteen or at maturity with a complete set of permanent teeth in absolute perfection, in perfect position in the arches and with perfect function of mastication. I further believe that it would be possible to produce in this way a proper and adequate development of the nose, so that the child would have a breathing capacity which would enable it to secure the proper amount of air necessary for the development and function of the tissues. A child treated in this manner by a combination of careful preventive dentistry and surgery, or medicine, would be enabled to overcome more than half of the diseases to which children are subject. The children's diseases which parents think to be a necessary evil are preventable, with perhaps very few exceptions. If the dental profession could only be brought to a realization of its duty and eagerness to perform it, we could almost put the medical men out of business. We do not want to do the medical men any harm, for we need them; but we could make stomatologists out of them, and

in the oral field put them to valuable use. I would be willing to countenance the stomatologists on such conditions.

I know a dentist in Detroit who has one of the best and largest practices in the state, and who maintains in his office an assistant in oral prophylaxis. He informs me that in the last four or five years the repair work on children's teeth has practically been eliminated from his practice. He has no dead or exposed pulps in his children patients' deciduous teeth to take care of, because he does not allow them to occur. He has a private practice over which he has absolute control, and that is the secret of his success in this direction. He has the confidence of his patients, and they are presented to him in time to make this work of prevention the most effective; and what he has done we all can do.

Dr. H. E. Friesell, Pittsburg, Pa. Of the many good points in the essay which have not been touched upon in the discussion, one needs special emphasis because I think it has been very generally overlooked by both the medical and the dental practitioner; that is, the effect of improper feeding, not only upon the deciduous teeth but also upon the tissues of the permanent teeth. We see today advertisements of many artificial food companies spread through all of our general literature. There is nothing which we as a profession should decry so much in the treatment of children's teeth as the raising or feeding of babies with artificial food. We should attempt to impress upon those of our patients who are parents that the feeding of a child with the bottle is not an adequate substitute for nature's food. Many cases of atrophy of the enamel and dentin of the permanent teeth can be traced directly to bottle-feeding of the child.

Another point which I have not heard emphasized in this connection is that frequently children are born with the condition that we know as ankyloglossia, or tongue-tie. I am sorry to say that the average physician evinces little knowledge of conditions of the mouth of the little infant, and the dentist is not consulted at that period, so the fact that the infant is unable to nurse properly on account of this condition of the attachment of the frenum is not discovered and remedied in time. I believe that we should, as dentists, attempt to call our medical *confrères'* attention to this condition. We will have difficulty in many cases to do this, but we should make an honest effort. I am speaking, regarding both these matters, from practical experience, and I think they should be brought to your attention.

Dr. F. L. Platt, San Francisco, Cal. I wish to say a few words in commendation of Dr. Jordon's excellent paper. It has been commended highly, but I think not highly enough. We should commend the basic principle which it contains to the fullest extent.

There is one point that is especially of interest to us, namely, the fact that in her practice, which is limited to the treatment of children and pregnant women, Dr. Jordon is educating the mothers of the coming generation. I have been asked many times by mothers, "How soon should I take my child to the dentist?" and I invariably tell them, "About five months before your child is born, so that you may get a little good advice." The diseases affecting the teeth and the digestive apparatus are preventable, as has been said, for most of them are allowed to attack children through the ignorance of the parents. It is in this respect that Dr. Jordon is doing the most

good, for which she should receive the highest credit. The care of children after they are born is of course necessary, but the care of the mother before the child is born is of equal importance. To relieve the suffering of little children is perhaps the greatest of professional accomplishments, but to prevent their suffering is almost divine.

Dr. JORDON (closing the discussion). I wish to thank the audience for their interest in the message which I have tried to bring to them, and hope that I have helped to create sympathy for the little sufferers who are crying out to us for help all over our broad land.

I also heartily thank the members of the association who so kindly discussed the paper. The poor children are not the greatest sufferers. The speakers of last night seemed to imply that it is the children of the poor who need attention, but they are not the greatest sufferers from pathologic conditions of the oral cavity in early life. My work has led me to have great sympathy for the poor little children of the rich, petted and indulged, and suffering in consequence thereof. In many such cases, I am sure the mother does not realize how she is retarding the physiological development of the child when, for fear it will suffer pain, she allows its teeth to be extracted under gas years before they should have been lost, thus depriving it of the much-needed masticating apparatus during the years of rapid development.

The question of the use of arsenic I knew would come up in this discussion. In reply to the criticisms made upon its use, I would say that I never put it into a tooth without having the parent promise that the child shall return within twenty-four hours. If I cannot be sure of the child's return in that period, I do not use it. I tell the parent that under favorable conditions we can remove the pulp by local anesthesia, but that it will cause more trouble and suffering to the child, because I am not successful in that method of operating in cases of children under six years; at least I am not as successful as I am by the use of arsenic—and the major part of my work is done in children under six years of age.

No one is more afraid of arsenic, if carelessly handled, than I am, but we must have some quick and sure devitalizing agent. If anyone will demonstrate a substitute that can be sealed into the tooth and will accomplish the work without, in the majority of cases, causing a twinge of pain, I shall be among the first to discard arsenic.

Conversing with Dr. Buckley this morning, I asked him what agent he employed for this purpose. He informed me that he uses arsenic, and that he does not believe that there will ever be any substitute for arsenic. I use so small an amount that the pulp is not devitalized on the floor of the chamber. I always say to the little boy or girl: "I may hurt you a little, but you take hold of the arm of the chair, and think that you are a soldier, and you know soldiers are never afraid," and they will submit to the removal, even when that pulp is partly vital. It is taken out the day following the treatment, and gives no further trouble. If the pulp is left in, it will die—the parents will know nothing about it, as there will be a covering over it—and an abscess will form. The child may perhaps be considered as suffering from some disease that is prevalent, when it is really suffering from slow blood-poisoning.

As to resorption, I have watched cases for about twelve years, and I find that it

is not interfered with, as I said in my paper, if the pulp has been removed in this way and the chamber has been filled with that simple paste of alum, glycerol, and thymol.

I hope that in time no child will be permitted to enter a kindergarten without presenting, together with its certificate of vaccination, another certifying to a healthy condition of the oral cavity. I also hope that at an early day the people will be educated by the wonderful campaign which is being carried on by the workers in oral hygiene so that they will demand that all candy kitchens and stores shall be removed from the vicinity of the schools, and as is the case in some of our high schools, carefully inspected lunch-rooms be conducted by the schools where no injurious or impure confections can be purchased. Then the people will not thrill with horror, as they did when it was found that a man who sold candy in front of one of our Los Angeles high schools for several years was a leper.

I am using gutta-percha, but I find that in approximal cavities it injures the gum. I have tried to put a saddle across of gold or some other metal as a bridge between the cavities, but have not been successful. One method may be more successful in your hands, and another in mine. The main thing is, let us save the children's teeth!

Section II then adjourned until the date of the next annual meeting.

PRESENTED TO THE COLLEGE OF
DENTAL AND ORAL SURGERY OF
NEW YORK BY THE DEAN
WILLIAM CARR, M.D. D.D.S.

SECTION III:

Oral Surgery, Anatomy, Physiology, Histology, Pathology, Etiology, Hygiene, Prophylaxis, Materia Medica, and Allied Subjects.

Chairman—Wm. Carr, New York, N. Y.
Secretary—Richard Summa, St. Louis, Mo.

FIRST DAY—Tuesday, July 19th.

The first session of Section III was held at 8 P.M. on Tuesday, July 19, 1910.

The chairman, Dr. Wm. Carr, introduced at the opening session of this section Dr. John P. Buckley of Chicago, who read a paper entitled, "The Importance of a Correct Diagnosis Before the Therapeutics of Diseases of the Dental Pulp," as follows:

The Importance of a Correct Diagnosis Before the Therapeutics of Diseases of the Dental Pulp.

By J. P. BUCKLEY.

The importance of making a correct diagnosis before the therapeutic treatment of diseases of the dental pulp has not received the attention from the profession which the subject merits. The "hit or miss" method of using remedies is still too much in evidence. This does not accord with the tendency in dental as well as in general therapeutics. Rational therapeutics is the watchword of the hour. The progressive dentist is no longer satisfied to know that ultimately good results may be obtained by the use of certain remedies in the treatment of certain diseases, but he is anxious to know what is the best remedy to use, and *why* it is the best, or *how* the results are brought about.

It is my intention in this paper to emphasize certain technical details, that it may be made as thoroughly practical as possible. I shall endeavor to discuss some of the many pathologic conditions of the dental pulp which present daily in a busy practice, and at the same time name remedies which are truly indicated in the treatment of the conditions.

I desire to say at the very outset that there are few pathologic conditions of the dental pulp, if any, wherein it would not be best to hermetically seal the medicament within the tooth at the first treatment. I well know that this is not the course pursued by the vast majority of the profession, but nevertheless my observation and personal experience in treating these cases have led me to this conclusion. To be able to hermetically seal a cavity in an offending tooth and at the same time be reasonably certain that by so doing we will not further aggravate the condition and intensify the pain requires more time than is generally given to these cases, as well as a knowledge of pathology and pharmacology. A knowledge of pathology is essential in order that a correct diagnosis may be made, and a knowledge of the action of drugs upon the tissues, organs, and functions of the body is important so that the proper remedy may be selected and used in the treatment of the case; for successful therapy depends upon a correct diagnosis, and this in turn depends upon a knowledge of pathology.

THE ANATOMY AND PHYSIOLOGY OF THE DENTAL PULP.

To know a tissue in disease one must first know it in health. Therefore, before considering its pathology, let us briefly review the anatomy and physiology of the dental pulp. According to our best histologists this organ is the remains of the original dental papilla, changed somewhat to meet its present environment, and is composed of soft embryonal connective tissue, with an outer layer of odontoblastic cells, the whole being well supplied with bloodvessels and nerves. Turner* describes the arrangement of the latter as follows: "The bloodvessels of the pulp communicate with the general circulation through the apical foramen or foramina of the tooth. One or more small arterial trunks enter the pulp cavity at the apex, and coursing occlusally through the center of the tissue, give off many branches. Near the occlusal end of the pulp they further divide into capillaries, and form a fine plexus around the peripheral portion of the pulp. The bloodvessels are generously distributed through the tissue. The veins form a similar plexus, and a central vein, analogous to the artery, receives the blood from these many venules and conducts it through the apical foramen. . . . The nerves of the pulp are transmitted through the apical foramina together with the bloodvessels. Several bundles of medullated nerve fibers enter the foramen and break up into a plexus of nerves, which are widely distributed through the pulp tissue."

The walls of the pulpal bloodvessels are unusually thin. The arteries are found to be almost devoid of the external fibrous coat, and according to Noyes the muscular layer is represented by a single involuntary fiber, while the walls of the veins are formed by a single layer of endothelial cells. After the root of the tooth is fully developed, the pulp has

* Johnson's "Operative Dentistry," 2d edit., page 77.

no further function to perform, except perhaps to furnish nutriment and innervation to the dentin. Clinical experience has demonstrated that the vitality of the pulp in a fully developed tooth adds nothing to the longevity of the tooth in the jaw. It has long been known that the pulp tissue, like the brain, contains no lymphatics, and when we recall the thinness of the walls of the bloodvessels and that the organ is confined within a cavity having unyielding walls, the absence of lymphatics becomes of the greatest pathologic significance.

This delicate susceptible tissue, therefore, is affected by, and responds to the slightest irritation, it matters not whether the irritant be of a thermal, mechanical, chemical, or electrical nature. Inasmuch, then, as any one of these various classes of irritants may cause hyperemia of the pulp, and this condition, if progressive, may be followed by inflammation and ultimate death, I will now direct your attention to the pathology of the pulp, considering, first, the symptomatology and treatment of the diseased conditions wherein it is possible and practicable to save the organ; and secondly, the symptomatology and treatment of dead pulps or such conditions of the pulp as clearly indicate its destruction and removal.

PATHOLOGY OF THE PULP.

It is often a very difficult problem for the conscientious operator to decide upon a method of procedure that will conserve the best interests of the patient. Especially is this true when we are trying to determine whether a diseased pulp should be saved or whether it would be best for all concerned to destroy and remove it. It is so easy in most cases to anesthetize or devitalize the pulp that many dentists resort to this method of treatment in nearly all diseases of the organ, but when we consider the fine tortuous canals which we so frequently encounter and the difficulty both of removing the dead tissue from such canals and of thoroughly filling them subsequently, it is a question whether or not the best interests of the patient are conserved by adopting this method as the general practice. I do not intend to plead for the life of the pulp when the reading of the clinical symptoms clearly indicates its removal, but I do mean to say that in all cases an effort should be made to determine as nearly as possible the exact pathologic condition, and our decision should be based upon these findings. From the viewpoint of the diagnostician there are no subjects of greater importance, except perhaps the fermentative and putrefactive changes which take place in infected dead pulp tissue, than those of hyperemia and inflammation.

ACTIVE VS. PASSIVE HYPEREMIA AND THE NECESSITY OF CORRECT DIAGNOSIS.

In the pulp tissue, as in all live tissue of the body, we may have two kinds of hyperemia, active or arterial and passive or venous. The former is defined as an excessive amount of blood in the arteries and the latter as an excessive amount of blood in the veins. Active hyperemia is due to a determination of blood to a given part as the result of reaction to an irritant, and as long as it remains without an excessive immigration of white blood corpuscles, it is active or arterial hyperemia. The cause of passive hyperemia is different. Here the blood may be dammed back, so to speak, by some obstruction in the veins which prevents the return of the blood to the heart.

Inglis* says: "The backing up of the blood following venous obstruction produces tension upon the vessels, followed by diapedesis of red corpuscles and exudation of watery fluid—the condition of edema. In inflammation arterial hyperemia appears as the first stage, followed by a collection of leucocytes along the walls of the small veins, and the immigration of some into the perivascular tissue. As this eventually leads to stoppage of the blood current, and even to stasis, the condition is essentially a venous hyperemia. Accompanying the immigration of leucocytes is an exudation of lymph, highly coagulable in character, which distends the lymph spaces in the tissue and produces the characteristic swelling."

Let it be understood, then, that in inflammation or even in venous hyperemia certain blood elements escape through the temporarily dilated vessels into the perivascular tissue, which becomes coagulated, and when the tissue involved is the dental pulp, which, as we have learned, is without lymphatics, this coagulation of the fluid elements of the blood means death. The procedure of many practitioners when an aching tooth presents is simply to find out whether the pulp is dead or alive. If alive, cocain hydrochlorid or arsenic trioxid is generally applied, or else the tooth is treated by simply placing cotton dipped in oil of cloves or some other soothing remedy in the cavity, and the patient is dismissed without making any effort to ascertain the condition of the pulp—whether it is in the stage of active hyperemia or passive hyperemia or true inflammation. If, on the other hand, the pulp is found to be dead, the tooth is too frequently treated by opening up the pulp chamber and placing therein a pledget of cotton dipped into the most convenient remedy at hand, leaving the cavity unsealed for fear of stirring up a "veritable hornet's nest," and making no further effort to ascertain whether the pulp has been infected by pyogenic micro-organisms producing pus on the exposed surface or, as sometimes occurs, within the substance of the tissue, or whether the germs inaugurating the changes are causing pulp decomposition with gaseous end-products. It is highly essential, therefore, when a patient presents with an aching tooth, that we take the time and trouble to determine not only whether we have a live or a dead pulp with which to contend, but, if the pulp is alive, whether the condition is one of active hyperemia only or passive hyperemia or inflammation; or, if the pulp is dead, whether the condition is a so-called septic pulp with pus formation or one of true putrescence with gaseous end-products. To confirm our diagnosis the tooth should be isolated and kept dry either with the rubber dam or with bibulous paper, and a careful examination made. On no other basis can rational therapeutics be practiced.

DIFFERENTIAL DIAGNOSIS.

It is generally easy, by asking a few questions and observing conditions, to differentiate between the pathologic conditions of a vital pulp sufficiently to determine whether the pulp had better be saved or destroyed. In acute active hyperemia the pain occurs only when the irritant is applied, and subsides almost momentarily without treatment. Logan*

* *Dental Cosmos*, vol. li, p. 1069.

* *Dental Review.*

states that—"Active hyperemia exists in a pulp when the pain begins with a known irritation, lasting only a few moments, or minutes at the most, and subsiding without treatment and not starting again until the application of another known irritant is made."

TREATMENT OF ACTIVE HYPEREMIA OF THE PULP.

The treatment of active hyperemia consists in protecting the tooth from the irritant which caused the disease. If a cavity exists which is causing the trouble, an anodyne remedy is indicated. It is well to combine with the anodyne a drug which will also sterilize the dentin. For this purpose I use phenol compound, the formula for which follows:

℞—Menthol,	gr. xx (1.3 gm.)
Thymol,	gr. xl (2.6 gm.)
Phenol (liq., U. S. P.),	f℥ iij (12.0 ccm.)

The menthol and phenol in this remedy, being anodynes, will cause the hyperemic pulp to revert to normal, while the thymol will penetrate and sterilize the dentin. The dressing should be retained with a quick-setting cement. Where the cavity is deep, extra cotton or concave disks may be used, thus having only a veneer of cement, which facilitates the subsequent removal of the dressing. Many pulps have been irritated and frequently passive hyperemia or inflammation have been produced by the injudicious use of gutta-percha for sealing-in dressings or for separating purposes when approximal cavities existed. Unless due care is taken in the use of this material, even when the cavities are not deep and when no active hyperemia is present, infectious material or the medicine is liable to be forced through the dentin and into the pulp, causing the diseases above mentioned and jeoparding the life of the organ. Cement had better be used for temporary sealing purposes, and before separating carious teeth with gutta-percha the cavities should be cleansed of débris, and the dentin sterilized. The cause of pulp trouble following the filling of a vital tooth can often be traced to the lack of sterilization of the dentin before the filling was inserted. One treatment of phenol compound should cure a case of active hyperemia due to caries of the tooth. At the second sitting, if the case has a favorable history, the rubber dam should be adjusted and the dressing and carious dentin removed, after which a base of cement may be inserted, the cavity prepared, and the tooth filled. In those cases where the cavity is deep and encroaches upon the pulp, it is best to place an intermediate layer of some antiseptic and non-irritating material under the cement. Here I use a paste made by mixing thymolized calcium phosphate (powder) and phenol compound (liquid). The formula for the powder is—

℞—	
Thymol,	gr. x (0.6 gm.)
Calc. phos. precip. (purified),	℥j (32.0 gm.)

Thymol has a peculiar but favorable action on animal tissue, and it is for this reason that I prefer to have the drug as a constituent of remedies used for treating certain pulp diseases. Its action, however, must be modified by other drugs to meet the necessary requirements. I desire to emphasize the use of some such antiseptic and non-irritating paste in these deep cavities, and also the importance of covering the entire floor of the cavity with the material, thus protecting the pulp from the irritating action of

the phosphoric acid of the cement used to cover the paste and to form the base for the filling. It should be understood that this paste is only intended as a protecting agent for the pulp. *It does not set.* To bring about "setting," it would be necessary to use some substance for the powder and an acid for the liquid which would react upon each other. This would cause irritation and might produce the disease which we are endeavoring to cure. When no exposure of the pulp exists, it is well to add a small amount of aristol or europhen to the paste. These are both iodin compounds and act as mild stimulants to the pulp, thus causing secondary dentin to be deposited, when we have nature's protection.

Treatment of exposed pulps. The treatment to be followed in trying to save an exposed pulp will not be discussed in this paper, for the reason that I do not believe in pulp-capping unless some exceptional condition demands it, as, for example, an exposure of the pulp in a tooth with the roots not fully formed. Here it is our plain duty to try to save the pulp, if it be normal, or in such condition that it can be restored to normal by proper treatment. Should the pulp tissue be in the stage of passive hyperemia, it is doubtful whether it is worth while to try to save it, though the organ is known to show remarkable recuperative power when properly treated. Should the clinical symptoms, however, show the stage of true inflammation, the pulp must be destroyed, and if the roots are not sufficiently formed for the apices to be closed with the root-filling material, the tooth will have to be extracted. This condition occurs so frequently in lower first molars of children that should the campaign for educating the public on dental topics result in nothing more in the future than the saving of these teeth, which have so often been lost in the past, it will prove to be of wonderful benefit to humanity.

TREATMENT OF PASSIVE HYPEREMIA AND TRUE INFLAMMATION OF THE PULP.

As far as therapeutics is concerned, it is of little importance to know whether the pathologic condition of the pulp is passive hyperemia or true inflammation. In either case we have transudation of the fluid elements of the blood and diapedesis of the red corpuscles occurring, and this means death ultimately. In passive hyperemia the pain is more constant than in active hyperemia, and may start without the application of an irritant. In inflammation the pain is continuous and of a boring character, or it may be lancinating, and is frequently described by the patient as a "jumping toothache." When the reading of the symptoms indicate either of these conditions, our therapeutics differs from that prescribed for active hyperemia, for here, as has been previously stated, the pulp must be destroyed.

ANESTHETIZATION AND DEVITALIZATION OF THE DENTAL PULP, AND THEIR INDICATIONS.

There are two general methods of destroying the dental pulp, anesthetization and devitalization. Fortunately, the pathologic conditions which necessitate the removal of the pulp are more often found in teeth with extensive cavities, and as a rule, after removing the débris and spraying the cavity with a warm antiseptic solution, the carious dentin can be removed carefully and the pulp gently exposed at some favorable point. This

may increase the pain for a moment, but the application of an anodyne remedy, such as the phenol compound mentioned above, will stop the pain at once. If this is done under aseptic conditions, I know of no good reason why the pulp should not be removed at once by pressure anesthesia, and an anodyne remedy sealed in the tooth. Here again I must emphasize the use of the rubber dam and the sterilization of the teeth, especially of the dentin of the affected tooth. If the dam cannot be adjusted, the pulp had better be destroyed by the devitalization method. I shall not discuss the details of removing a pulp by either of these general methods, but I must call attention to the fact that in pressure anesthesia it is highly essential that the dentin be sterilized as well as possible before applying pressure. The usual custom of applying coagulating agents, such as phenol, cresol, etc., to the cavity for a few seconds does not sterilize the dentin to the degree desired. The best results are accomplished by employing germicidal agents which are soluble in water. In cavities where the decay is not deep, the dentin can be sterilized by the use of a ten per cent. solution of formaldehyd to which five per cent. of sodium borate (borax) or sodium carbonate has been added. When the caries has approached the pulp closely, this solution is liable to cause pain, in which case the same result can be accomplished by the use of a 1:500 solution of mercury bichlorid or a 1:200 solution of sublamin. In using the latter solutions the pliers on which the remedy is applied should be wiped immediately on an antiseptic doily to prevent the mercury from acting upon the instrument. In our brief discussion below of the devitalization method, it will be pointed out that the carious and infected dentin can be completely and painlessly removed after the devitalizing agent has been applied, thus mechanically sterilizing the cavity; but in the anesthetization method the infected dentin is sensitive, and cannot be removed without unnecessarily producing pain. The dentin in this case must, then, be sterilized by chemical means, for to force the anesthetizing solution through the dentin without previously sterilizing it means the forcing of micro-organisms and perhaps poisonous ptomains into the pulp tissue, and many times into the tissue surrounding the apical end of the root; for it is difficult to force the solution to and only to the apex. Thus too much pressure and lack of thorough sterilization constitutes a prolific source of pericementitis following the removal of pulps by this method.

After removing the pulp by pressure anesthesia it is always best to place dry cotton in each canal, and then a small pledget of cotton, dipped in the anodyne remedy, should be placed in the pulp chamber. Especially is this true if thymol is a constituent of the remedy, for this drug, if placed too near the apex of the tooth, may penetrate sufficiently to cause a mild active hyperemia in the pericementum. This of course will soon subside, but it is best to avoid it when possible.

In case the operator prefers to use the devitalization method, the arsenical application can be made at once, providing the congestion of the pulp has been relieved by permitting it to bleed freely. When this cannot be done, it is best to allay the pain by sealing in the tooth an anodyne remedy for at least twenty-four hours before making the arsenical application. It should be remembered that arsenic trioxid, when applied to de-

nuded surfaces such as an exposed pulp, is a powerful and painful escharotic. Its action, therefore, should be corrected by combining it with drugs which possess local analgesic properties. A formula for an excellent devitalizing paste is—

℞—Arsenic trioxid,	ʒj	(4.0 gm.)
Cocain (alkaloid),	gr. x	(0.6 gm.)
Thymol,	gr. v	(0.3 gm.)

The amount of alkaloidal cocain and thymol in this formula, when liquefied by triturating in a mortar, is sufficient to make a paste of the arsenic trioxid. I prefer to use a fiber, which is made by adding a small amount of liquid vaselin to this paste, the whole to be thoroughly incorporated in some fibrous vehicle. The fiber should then be colored with some agent which will not stain the tooth structure, so that the preparation is of a different color from the cement which is used to seal the remedy in the cavity. No special care need be taken at this time to sterilize the dentin, for all of the affected dentin can be painlessly removed at a subsequent sitting; therefore in this method it is possible to mechanically sterilize the dentin. Great care should be taken, however, to see that the gingival margin of the cavity is dry, otherwise the remedy may escape at this dangerous point, and much harm may result.

There are two ways of treating the tooth after the pulp is devitalized. One is to remove the tissue at the time the arsenical dressing is removed and then seal an anodyne remedy in the canal; the other, and I think the better way, is to remove the arsenical dressing at the second sitting and then seal in contact with the tissue some remedy containing thymol. I use phenol compound for this purpose. At the next sitting the pulp can be removed and the canals dried and filled.

TREATMENT OF PUTRESCENT PULPS AND VITAL APICAL PULP-ENDS.

In those cases when, on opening into the pulp chamber under aseptic conditions we find the pulp to be dead, we should ascertain if the tissue has been transformed into pus with practically no odor, or whether we have gaseous end-products with the characteristic odor of a putrescent pulp. In the majority of cases the latter condition will be found to exist. However, it is very important to differentiate between the two conditions, for the therapeutics differs. We may find pus in the bulbous portion of the pulp chamber with the tissue in the canals near the apical ends still vital. The treatment to follow when pus is present is to wash out the pus or dispose of it by mechanical means, after which the pulp chamber can be dried, and a remedy having the properties of phenol compound should be hermetically sealed in. The anodyne property will control the pain, while the thymol will again disinfect. If at the second sitting a portion of the pulp proves to be vital, as is frequently the case in such a condition, the remnant of the pulp can be anesthetized by using phenol compound, or U. S. P. liquid phenol and pressure, cautiously applied, with unvulcanized rubber. Frequently I have desensitized such a remnant by gently working phenol-sulfonic acid into the canal with a smooth broach. This remedy is made by gently heating for a long period 95 parts by weight of concentrated sulfuric acid with 93 parts by weight of pure, colorless phenol. When the reaction is completed, a sufficient amount of distilled

water is added to make the finished product assay about eighty per cent. phenolsulfonic acid. After the removal of the remnant, the acid should be neutralized with a ten per cent. solution of sodium bicarbonate, the canals dried with alcohol, and an anodyne remedy sealed in the tooth.

TREATMENT OF ENTIRELY DECOMPOSED PULPS AND PUTRESCENT CONDITION IN THE CANAL.

As has been previously stated, when the pulp is dead and has been infected for any length of time it will more often be found to be fully decomposed, and a putrescent condition will exist in the canal. By this I mean that the canal will contain intermediate and end-products of pulp decomposition, but no pus. The nature of such products I have described in detail in other articles, and need not again speak of here. We are interested here to know what remedy we should apply when this condition is found to exist. Formocresol is a specific for this condition, the formula for which is as follows:

℞—Solution formaldehyd,
Cresol (colorless), āā f℥j (4 ccm.)

After we are certain of our diagnosis, the pulp-chamber should be opened into aseptically and in such a manner as to expose the mouths of all the canals, when the remedy should be hermetically sealed in the pulp-chamber. The formaldehyd gas which is constantly generated from this solution will neutralize the gaseous end-products and also cripple the bacteria. The cresol corrects the irritating action of the formaldehyd, and adds to the disinfectant property of the remedy. This first dressing can safely be changed the following day, but no harm will follow if it remain a week or more. Generally I leave it two or three days; it is then removed, the canals are mechanically cleansed, and a dressing of the same remedy is again sealed in each canal. At the next sitting the canals should be in such condition as to allow of their being filled.

We sometimes find the pulp tissue putrescent in one or more canals of a multirooted tooth and vital in the other one or two canals. In these cases, which heretofore were difficult to treat, we will find much satisfaction in the use of formocresol. Until the patient has had a second sitting, it is difficult at times to know whether this condition exists, and if there is much vitality in the tissue, the remedy may cause the tooth to ache. There is generally enough putrescent material in the pulp-chamber, however, to neutralize the formaldehyd gas, and the tooth even in these cases will not ache long. After we are certain of the condition, the method of procedure is simple, and the results are positive. A small pledget of cotton, dipped in formocresol, can be placed over the mouth of the canals which are putrescent, and this covered with a quick-setting cement. After the cement has set, the vital tissue, having been sterilized by the previous application of formocresol, can be anesthetized or devitalized as the operator deems best. It is never advisable, however, to place an arsenical preparation down in the canal to devitalize a remnant of the pulp.

I have not considered all of the diseased conditions of the dental pulp, but have endeavored to discuss the pathology and treatment of such conditions as are present daily in a full practice, and I trust that I have shown the importance

of making a correct diagnosis before applying remedies in the treatment of the case. The day is passed when a few remedies will answer the purpose of the successful dental practitioner. In treating diseased conditions of the dental pulp I am certain that the best results will be obtained when we follow the general rule that all remedies should be sealed with cement. This will force us to correctly diagnose the condition and employ the means and remedy indicated in the rational treatment of the case. Until we are willing to spend the necessary time to accomplish this end, we shall not be living up to the highest ideals of our calling. I know that remedies can be hermetically sealed in teeth with gutta-percha or some of the temporary stoppings, and many use the latter plan for sealing purposes in preference to cement for the reason that should the tooth ache, the dressing is easily removed by the operator or by the patient at home; and the giving of instruction along this line is a daily occurrence in many dental offices. He who uses temporary stopping because it is easily removed, and instructs his patient how to remove it should the tooth ache, either does not understand the condition which he is treating or else he has no confidence in his remedy. If, in pulp diseases, the case has been correctly diagnosed and the proper remedy has been hermetically sealed in the cavity without pressure, the tooth will not ache for any length of time—it matters not what the pathological condition may be. Let us delve more deeply into the sciences of pathology and pharmacology, and after having learned to read the symptoms of these various diseases, we can apply our therapeutics accordingly.

Discussion.

Dr. M. L. Rhein, New York. Not having had an opportunity of reviewing this paper, you will pardon me if I cannot, upon this sudden call of the chairman, give the paper the discussion which it merits. The subject and the manner in which it has been treated deserve our closest attention. The more or less deserved criticism has been made that in the treatment of the dental pulp, one of the most important organs that we have to treat, it has been the practice of the dentist to proceed in an empirical way, and from this very empiricism a feeling of fear and of diffidence has grown up in the profession about treating the dental pulp in any of its phases. The admirable paper to which we have just listened, if studied carefully, will show to us the possibility of treating the dental pulp with the same assurance with which we would undertake to remove carious portions from an ordinary cavity and fill the tooth. With the assurance of a positive knowledge of our subject, we can then utilize our knowledge of the pathology and of the pharmacopeia and deal with the conditions as we find them. This is the essence of the lesson that has been taught us by Dr. Buckley tonight.

It has been my purpose for a number of years to inculcate in my own modest way this same lesson, and it is a great pleasure to me to add what I can to the weight of the message that has been brought to us by the essayist.

The dread of treating pulps which are devoid of vitality or are in danger of losing their vitality is our common inheritance from those years when there was no scientific medication practiced in

any branch of medicine. This method of going ahead blindly and treating one pulp in the same way as any other, that has been handed down from the earliest period of dentistry, has inspired many with this feeling of fear, and is responsible for that deplorable condition of being afraid to seal up the pulp chamber of a tooth.

We cannot emphasize too strongly Dr. Buckley's view that there can be no condition in the pulp chamber in which it cannot be hermetically sealed, any more than the fact that there ought to be no condition of pulp treatment in which the rubber dam should not be applied, if it is possible to do so; and those cases in which it is impossible to apply it are so rare that the necessity of its application may be safely laid down as a rule.

I differ just a little with the essayist on the question of sealing remedies into the cavity. I have, in the course of thirty years' practice, never to my knowledge dismissed a case in which the pulp cavity had not been sealed, but I see no reason for using cement in every case. There are certain classes of cases in which lack of time and the nature of the remedies used may render it more feasible to use some soft stopping of gutta-percha—for the greater length of time requisite for removing the cement makes its application in every case inconvenient. I find the use of the gutta-percha stopping in my practice more expedient, as obviating the necessity of cutting out the cement, however lightly it was placed in position. On this account I cannot take Dr. Buckley's strong position in this respect, although I fully agree with him that if there is any danger of the patient taking out the sealing substance, then some cement ought to be used.

The description of the function of the pulp was well given by the essayist, and his definitions of the different kinds of inflammation that attack the pulp are so clearly expressed that they are worthy of the most careful study.

There is no question that the sensitiveness of the ordinary exposed pulp is due entirely to active hyperemia; but in those cases in which the pulp is so nearly exposed that we are not certain at the first sitting as to the status of the actual condition and the amount of infected dentin that must be removed from such a tooth, I have found that often it is impossible to make an exact diagnosis as to whether we have a small pulp exposure or not. When I say a small pulp exposure, I mean that if there is any carious dentin left over the pulp, it is essential that it be removed. While the essayist, according to my recollection, did not see fit to dwell upon this point, I know of no form of therapeutics that we can derive from our pharmacopeia that will insure the harmlessness of infected dentin to the pulp itself.

I would like to add one little suggestion to this admirable paper, viz, that if we are to treat these cavities properly, we must realize that all infected dentin must be removed, even though this procedure should necessitate an entrance into the pulp tissue itself.

I agree thoroughly with Dr. Buckley in the methods of treatment of exposed pulps which he has so thoroughly outlined, up to one point, and that is the apparent fear of removing the pulp on account of the danger of not successfully removing every particle of it, and leaving the apical ends of the canals aseptic and hermetically sealed. In all of the cases of attempted pulp-saving in teeth of patients past the age of puberty,

there are very few in my recollection in which I have not regretted such attempts. It is true that there are a very limited number of cases of abnormal condition of the roots in which it is impossible to remove every particle of organic substance and to seal the ends of these roots, but I have become firmly convinced by all the data I have been able to collect that the percentage of these cases is very largely exaggerated, and believe that ten per cent. more than doubly covers their actual number. Consequently, I do not think that we ought to take this into consideration. At the present day, when we have at our command the use of the radiograph, and thereby the possibility of bringing the outline of a root before our vision perfectly, we should not hesitate to proceed with such an operation. For my part, I would rather see a tooth extracted than to have an infection of the pulp occur at some later time when the patient is either in bad health or removed from the possibility of treatment. The bad results following pulp capping eventually occur at a trying period in the patient's life, at a time when his power of resistance to infection has been rendered weaker by illness or overwork, when he should not be subjected to the possibility of alveolar abscesses. I know of a number of cases in which death has resulted at precisely such periods, due to nothing else than alveolar abscess, which never would have occurred if these pulps had been removed instead of a treatment of procrastination being followed. That is how I look upon the attempted treatment of saving exposed pulps in people of mature age.

I go perhaps a little farther than the essayist did in his paper when I say that it is perfectly feasible at the present day to treat a pulpless tooth with the same assurance and with the same degree of positiveness that the essayist has treated the other subject in his paper. I claim that if the anatomy of the roots of the teeth be studied by means of the radiograph, we know the exact angle of entrance at which we can proceed to the end of each individual root. With the knowledge of chemistry at our disposal and with the remedies at our command we can proceed with our instrumentation and remove from the canals every vestige of organic tissue that remains, and then aseptically seal the canals to the very end. I grant that this is an operation which in a multi-rooted tooth frequently requires a great deal of time. It may take hours to secure perfect results, and the value of that work is dependent on the value which the operator and the patient place upon the preservation of that particular tooth. In this respect we are the educators of our patients, and it devolves upon us to instruct them as to the value of such a tooth, and what its preservation in a condition of health means to them. If the pulp is removed from a multi-rooted tooth in such a manner that there is no possibility of infection passing through the apical foramina into the apical space, and the root-canals are hermetically sealed, we leave the patient with a tooth that will very likely remain in his mouth during the remainder of his life. It makes no difference how much of the crown, or whether all of the crown of that tooth is removed, for the health and conservation of the structure which remains depends upon the health of the root itself.

Our technique today enables us to supply our patients with artificial teeth which will be as permanent in the mouth

as the natural teeth, if we can place the roots in a comfortable and healthy condition.

It is impossible in this limited time to go into this subject as thoroughly as I would like. I am endeavoring to select those points that I think to be of particular interest, and am especially endeavoring, while I am in general in harmony with the essayist in all these matters, to do him the favor of trying to find some points in which I can differ from him.

I was attracted by one sentence regarding the matter of pulp extirpation, which rather surprised me. Dr. Buckley said that if the apical foramina are so large that they cannot be properly filled, it is necessary to extract the tooth. I have found, aside from the actual resorption of the roots themselves, in multi-rooted teeth, no root with an end so widely open that it could not be properly and hermetically sealed. The class of cases I have reference to is that in which the roots have not yet been perfectly developed. I have had occasion to save a number of teeth of this character, and while they necessitate a very careful technique of operation, I believe that the partly developed roots of teeth can be and should be successfully filled. I have no doubt that there are some of the molars, especially the first molars, in which the roots may be so slightly developed that filling may be impossible, but I have never found them in exactly that condition.

As I said before, we have the radiograph, and if the focus of our picture is accurate it gives the exact length of the root, and shows exactly how far a filling should go in the canal. In this connection I would say that it is my conviction that the sealing substance of a root-canal, while it must be aseptic so that it cannot possibly produce infection, should be absolutely non-irritating. I know of only two substances that answer this purpose, one being some form of gutta-percha and the other some form of paraffin. Concerning the latter, the filling of the root-canals with paraffin is still in the experimental stage, but if this is proved to be a satisfactory material, I believe it is a most admirable medium for such a purpose, and indeed may prove to be the best which we have at our command at the present time.

I mention this because I believe it is necessary to have our filling material pass the end of the root a little distance, rather than to fall short of the end even the most infinitesimal distance, because it is the very end of the root that is the vulnerable point, and if we leave the smallest portion of the apical end of the root unfilled, and unsealed, there is a possibility of a future infection, of a focus for an abscess and necrosis. If a non-irritating substance is used, such as I have mentioned, even though it be passed beyond the end of the root, the tissues accommodate themselves to the filling, and no bad result need be anticipated. The slight hyperemic condition that follows this treatment and the hyperemic condition discussed by the essayist that follows the removal of pulps by pressure anesthesia, should not deter the scientific dentist who knows the proper technique for the work. Even though the patient must have a little discomfort for a few hours, such a procedure is justified by the result which follows therefrom, and it is far better to have a treatment which will result in permanent health than to adopt one which is but a temporary expedient.

I want to emphasize all that the es-

sayist has said about the necessity of sterilizing the dentin if the pressure method of anesthetizing be employed. He has made his statements on these subjects so clear that any practitioner can proceed according to the directions given in the essay in the most scientific manner. I will say, in conclusion, that if we would secure the confidence of our patients it becomes essential that we should treat the pulps of teeth with the assurance that a scientific knowledge of the subject alone will give us.

Dr. A. H. Peck, Chicago. It is my purpose to occupy but a few minutes of your time, and not to enter into a discussion of details. The main purpose of the essayist in presenting this paper apparently was to impress upon our minds the desirability, indeed the *necessity,* of proficiency in the matter of diagnosis. I have always believed, ever since my professional experience has been sufficient to enable me to consider and judge these matters from a serious standpoint, that proficiency in the matter of diagnosis is one of the most important equipments of an intelligent practitioner.

I early became enthused with the importance of it, and I could wish that this paper had been quite exclusively confined to this question of diagnosis, with less of the therapeutic feature. I say this with no thought of criticism, but because we as a profession do not lay sufficient stress upon the importance of a complete, thorough, and definite diagnosis.

I wish to refer to just one or two practical cases of general importance, one of them lying not strictly within the domain of dentistry alone, with a view of reinforcing what I have just said.

Not many years ago, a brilliant and promising young lawyer of Chicago lost his life because of his attendant's inefficiency in the matter of diagnosis. He was afflicted with an alveolar abscess, one of those diffuse purulent infiltrations of the tissues, and not of the kind which more frequently presents, *i.e.* the red, well-formed rounded abscess, so that the diagnosis no doubt was rather difficult; but even so, there was, in my opinion, no excuse for a mistake in diagnosis in that case. His attendant evidently was not fitted to cope with the condition, and it went on until septicemia set in, and the true nature of the trouble was not discovered until too late to save his life.

Another case of a general nature, which belonged to the general practitioner, was that of an individual whom no doubt many of you knew personally, Dr. Menges, who died a number of years ago. I am perfectly familiar with the conditions in his case. His family physician carried him along for some time after he was stricken, on the theory that he was suffering with a passage of gallstones, and treated him for that ailment, thoroughly saturating his system with opiates and anodynes in order to lessen the suffering which he was undergoing. Finally a competent physician was called in consultation, who almost at the very instant when he laid his eyes on the suffering man said that there was no gallstone trouble at all, but that appendicitis was the real cause of trouble; and again it was too late to save the patient's life. I could recite numerous cases more or less known to me personally, and also from the records, of dire consequences resulting from the attendant physician's or dentist's incompetency in the field of diagnosis.

What a satisfaction it is for a practitioner of dentistry to be able to correctly diagnose the ailments of dental

pulps which the essayist has laid stress upon! As he has correctly said, when a pulp is suffering, from active hyperemia especially, it can be saved in ninety-nine cases out of a hundred, and perhaps without any percentage of failure at all, if we are able to correctly diagnose the ailment. When this is not possible, we should be able to discover that fact promptly, so that we may waste no time and put our patients to no unnecessary inconvenience by carrying along treatment with the endeavor to palliate or cure, which may result in failure to save the pulp.

I wish it were made a matter of positive obligation on the part of all of the dental colleges in existence to teach diagnosis so thoroughly that every individual who passes out from the doors of such colleges as a graduate in dentistry might be just as proficient in that respect as he usually is in the matter of preparing a cavity and inserting a proper filling. I sincerely hope that Dr. Buckley, who is engaged in the teaching of the subject under consideration, viz, therapy, and all other teachers in our other colleges, will lay all possible stress upon this matter and send their students out proficient in the matter of diagnosis.

Dr. Frank L. Platt, San Francisco, Cal. It affords me a great deal of pleasure to say a few words in commendation of the paper read to us tonight by Dr. Buckley, for it seems to me that it touches the keynote of practically every department of our operative procedures. The basis of all great work is system, the scientific application of facts, of well-established principles, of known methods. The same applies to the question as to whether the gold inlay or the gold filling should be used. The simple application of established facts and principles solves the difficulty at once.

It has been a matter of great wonder to me why so many men of our profession are careless, even criminally careless, in their diagnosis and treatment of pathological conditions. Within the last week two patients presented themselves to me for treatment of putrescent pulps. In one case the patient has been under treatment for three weeks, in the other for five months, and all that had been done was the mere placing in the pulp chamber of a piece of cotton saturated with some medicament supposed to be a germicide, leaving it for a few days, and renewing it. Both of these cases came from the hands of practitioners of fair reputation. Both of these practitioners must have belonged to that class described by the philosopher-humorist, Bill Nye, as men who "reason with a fungous growth and think with a fatty degeneration called brains."

I was glad that the essayist called particular attention to the dangers attendant upon the use of arsenic, and I wish to call attention to two cases of arsenical necrosis which I have seen, in both of which pressure anesthesia was applied after the pulp had been only partially devitalized with arsenic. I think that enough arsenic had been forced through the apical foramen to affect the surrounding tissues. The danger of the use of pressure anesthesia was very happily expressed by the essayist. There must be sterilization before the pressure is applied, and that sterilization cannot be successfully accomplished in the majority of cases at the time of operating, therefore further time must be allowed. I do not believe that it is possible to sterilize infected dentin in a few min-

utes. The application of the remedies mentioned by the essayist will in most cases relieve the practitioner from all anxiety as to what will happen if he does not remove every vestige of pulp tissue and seal every root to its apex. In my experience the only place where such thorough operations are performed is the platform at such meetings as this. By this I mean to say that, in my opinion, it is a physical impossibility for any operator to fill a root-canal to the very apex, or to remove every vestige of pulp tissue that may be in any canal.

Not long ago I saw an exhibition of a number of radiographs taken to show malposition of the teeth in the alveolar process. Many of these teeth had been treated and filled. At the close of the exhibition I was asked to make some remarks, and I said that I felt certain that the pictures were at fault, because they disclosed a condition which judging from the articles in our journals and the reports of our proceedings, could not exist, since we always filled the canals "just to the apex," and there was not one picture which showed a canal filled "just to the apex"! I do not believe that all of the teeth exhibited had been filled by poor operators either.

I believe Dr. Buckley offers us a method of practice which will relieve us of the anxiety which we should have if we had left unsterilized tissue in a root-canal.

It is difficult for an operator who lives outside of a city to avail himself of the X ray as a method of diagnosis. The adoption of a systematic, cleanly, and antiseptic method of practice, in my opinion, is all that the average operator can possibly demand or can apply, and Dr. Buckley has indicated a most rational method of treatment, quite the best that has ever been presented before a dental association.

I believe that cement is the best material for sealing a cavity, but it may be used in connection with a temporary stopping of gutta-percha in a way which will not lead to inflammatory conditions, and this combination enables one to remove the cement much more easily. Take, for instance, a deep cavity in a molar or bicuspid involving the pulp so that treatment must be resorted to. The antiseptic paste or devitalizing agent, or whatever is chosen, is placed in the position demanded and covered with a little excess of cotton. Then a little wafer of temporary stopping that will a little more than cover the floor of the cavity is pressed out, warmed, placed in position, and with a small burnisher pressed against the margins of the cavity, but not with sufficient pressure to force the dressing into the pulp. Then a coating of cement is placed over the temporary stopping. This will not be feasible on the occlusal surface, but it will on the buccal or approximal sides.

What the essayist has said about the use of arsenic is a timely caution for those who use it, but it seems to me to be about time for this drug to be banished from the dental armamentarium. I have not used arsenic for seven or eight years, and hope never to use it again. In the majority of cases, I believe, it causes unnecessary pain, it takes too much time, the element of danger is always present when it is used. Pressure anesthesia applied either directly to the pulp or through dentin unaffected by caries, will be effective, or if this cannot be employed, peridental anesthesia can be induced safely.

I hope that before many years the majority of the profession will take my

standpoint concerning arsenic, and remove it from their medicine cabinets.

What the last speaker said regarding the teaching of students appeals particularly to me, for I have met a good many young men, some of whom were still students, some graduates and still students, and some graduates who were not students, and they knew neither how to diagnose the conditions mentioned nor other average conditions, but worked empirically. Many of them were possessed of good mechanical ability, but they lacked knowledge of technique and diagnosis, both so essential for successful practice.

I was told by a member of a state board of examiners, not long ago, that when a graduate of a college in the United States was placing a gold filling in a tooth in taking an examination before the board, it was noticed by my informant that the patient's head went back rather unnecessarily when the mallet was used; so he went to the chair and examined the patient's mouth, and found an alveolar abscess on the gum which this college graduate had not discovered, or had failed to appreciate as a condition which should be looked into.

Dr. R. Ottolengui, New York. I had no intention of taking part in this discussion until my *confrère* from California spoke, and I trust he will pardon me for taking issue with his remarks. He said that the exact filling of root-canals to their apices occurs more often on the platform of meetings like this than it ever does in practice, and that sentiment was applauded.

That to me is an index of a very unfortunate condition. The applause seemed to indicate that all those who applauded agreed with the gentleman's statement, and, if that is true, it is again exceedingly unfortunate. It is very much the same as though architects were to admit that they never built the foundations of their houses accurately except in their plans.

It is quite true, and we say it with regret, that there are a few root-canals, and few they are in proportion to the whole number which we attempt to fill, which cannot be filled. It is also true that such statements as have been made by my *confrère* encourage men to believe that when they encounter some difficulty with a root-canal, that case is one of those which it is impossible to fill. It is for that reason that I regret that statement; if it were absolutely true, it should not be made. It is a great deal better to say that all roots can be filled, even if it be not true, because then, when one of the younger men in the profession meets a difficult case, he will remember that all of the older men claim that they can fill such a root, and that will incite him to greater effort. If that were done, ninety per cent. more roots would be filled than are filled today.

Dr. Rhein. I want to say in reference to what Dr. Ottolengui has so well remarked, that I do not claim that all root-canals which I have filled have been properly filled. I never made such a claim, but I maintain that every one of those root-canals that was not properly filled was so treated because my technique at that time was faulty. I say that with the strongest emphasis, and I object to the intimation that what I said in reference to root-canals was platform talk. I have hundreds of radiographs of root-canal fillings taken in the mouths of patients to demonstrate the correctness of my statement.

Dr. Ottolengui struck the keynote of this question. My root-canal work is better today than it was a month ago;

it was better a month ago than it was a year ago; it was better a year ago than it was the year previous. The only way in which a good and correct technique of root-filling can be evolved is by the experience gained in such work, and the only way in which the student, whether he be young or old, can acquire this correct technique is by attempting to fill such root-canals properly.

Dr. Platt said that if the essayist's treatment of root-canals was followed out, it was not necessary to attempt to fill the apical portion. I do not understand just on what basis he makes this statement, because the difficulty in the filling of these root-canals lies not in inserting the filling, but in removing every particle of organic tissue from the canals, while the sealing of the root-canal can be successfully performed by any student. The only reason why we do not, or think we cannot, remove all organic matter from these canals, is the operator's unwillingness to devote the necessary time to this work.

Dr. Platt. Dr. Rhein misunderstood me if he thinks that I consider it unnecessary to remove the contents of the root-canal. I believe it is necessary to remove all that can possibly be reached. What I meant to imply was that the rational treatment suggested by Dr. Buckley would relieve the operator's mind from any misgiving that he might otherwise have as to whether trouble would ensue had he not been able to thoroughly remove every vestige of pulp tissue from the canal.

Dr. Buckley (closing the discussion). I am indeed sorry that I incorporated in my paper a remark that caused the discussion to drift into the methods of filling root-canals, for I know of no subject that is so liable to engender so much discord as that. Everyone can fill root-canals better than everybody else, and I never yet have been able to meet an operator whom I could convince that I could fill a root-canal better than he.

The material with which a dressing is sealed in a tooth is of no importance, providing the dressing is sealed hermetically. I can hermetically seal a dressing better with cement, and am sure that my filling will not be forced down by the process of mastication, as might have happened if I had employed gutta-percha or some temporary stopping only. If Dr. Rhein or any other *confrère* can do that better with gutta-percha, I shall be the last man to object to it. The only reason why I object to the use of gutta-percha or temporary stopping as a sealing material is because it is easily removed by the patient. That is the reason for its use in fully fifty per cent. of cases of treatment of a putrescent pulp especially. The operator is afraid to seal it up because he apprehends that he might blow his patient's head off on account of the accumulation of gas. If a remedy is used that will take care of the gases, one need not be afraid. You really need not be afraid to seal a remedy hermetically in all these pathological conditions of the dental pulp, whether the pulp is dead or vital.

I want to be clearly understood on this question. I use cement simply because it is more convenient for me to do so. I do not object to the use of any other material for sealing purposes, unless it is employed merely because the patient can easily remove it in case the tooth aches.

However much I regret it, there are canals in multi-rooted teeth from which I cannot successfully, without producing more pericementitis than I am justified

in producing, remove all of the organic matter and thoroughly fill the roots. I can destroy all organic matter with caustics, but have not schooled myself sufficiently; I have not developed the technique necessary for using such caustics, whether they be alkalies or acids or both, in fine tortuous root-canals without producing excessive pericementitis. I know that Dr. Rhein uses something which he did not mention, and I have tried to use it, but am unable to obtain satisfactory results.

I do not question Dr. Rhein's ability for a moment, because I have seen him operate in his own office, and know he is sincere and conscientious when he says that he can remove that tissue and thoroughly fill the root.

I think this paper has been sufficiently discussed, and I will not take any more of your valuable time.

The next order of business, as announced by the chairman, was a lantern-slide lecture delivered by Dr. MARTIN DEWEY, Kansas City, Mo., entitled "A Study of the Temporo-Mandibular Articulation, Cusp, and Approximal Contact Point," as follows:

A Study of the Temporo-Mandibular Articulation, Cusp, and Approximal Contact Point.

By MARTIN DEWEY.

IN taking up the study of the temporo-mandibular articulation I will endeavor to show that there is a certain relation existing between it and the cusp and the contact point. There also exists a relation between the cusp and the contact point which can easily be followed; the various shapes, sizes, and lengths of cusps which are found have a definite relation to the contact point, and *vice versa*. I cannot say which plays the more important part or which is more active in forming the temporo-mandibular articulation. However, when we consider the temporo-mandibular articulation alone, I can say positively that the cusp and the contact point, together with the use to which they are put, are the factors which produce the differently shaped condyles, glenoid fossæ, and other parts which, taken as a whole, go to make up the temporo-mandibular articulation.

I may as well state that I cannot agree with a large number of papers that have recently been published in regard to the influence of the path of the condyle upon occlusion. I will admit that there is some good to be obtained by studying the path of the condyle in making dentures, inasmuch as it may point to what the occlusion formerly was; but even then, the path of the condyle as found and traced will only be a record of what has been brought about by occlusion or the working of the contact points and cusps. If this be the case, it is still greater folly to attempt to measure or trace the movements of the condyle and to regulate teeth accordingly, for the temporo-mandibular articulation is the result of occlusion and will change as occlusion changes.

I will show also that it changes in the life of every individual. Both sides of the dental apparatus may not be the same, and in that case the temporo-mandibular articulation would not be the same. Therefore I will show that the temporo-mandibular articulation is the result of occlusion and will change as the occlusion changes, and that the occlusion is governed by the shape, size, and relation of the cusps and approximal contact points, and the cusps and contact points have a different relationship existing between them.

The effect of use and disuse upon the teeth themselves has played an important part in the study of evolution. A great many men, including my friend Dr. A. H. Thompson, have stated that "function is the origin of structure." Without going into an extensive treatment of that phase of the subject, I will endeavor to show *what function* has been responsible for the temporo-mandibular articulation, and that this function came through the teeth. Some might say that the animal develops a certain tooth because he has a certain temporo-mandibular articulation, which demands a tooth with certain contact points and cusps. Against this latter statement we have several great facts which cannot be disputed, namely, evidence from an evolutionary, embryological, and anatomical standpoint. In evolution, the tooth has always assumed a position, shape, and form in advance of the temporo-mandibular articulation; in embryology the tooth develops first, and in anatomy we find changes taking place in the tooth which result in certain positive changes in the temporo-mandibular articulation. Some of these changes I will try to show.

In a study of comparative anatomy we find that the tooth has played an important part in the shaping of the temporo-mandibular articulation. I shall show how various teeth with their cusps and contact points have in turn produced a condyle and glenoid fossa of certain shape. We will follow the development of a temporo-mandibular articulation from the embryo to old age, and notice the changes which take place in different species. I shall also show changes which have been produced in man which are very similar to certain formations found in certain animals, the conditions having been produced in man by changes in the cusp and contact point. Many statements have been made in regard to the temporo-mandibular articulation and as to changes which might occur which would not have been made if the writers had possessed a better knowledge of the anatomy of the parts in question. The temporo-mandibular articulation is unique because of its range of movements and its peculiar development, which we will not go into. It has to do with a bone which is used in mastication, deglutition, and speech. It is intimately associated with a bone which was laid down as a part of the visceral skeleton, and, like the bone, has passed through many changes before reaching its present form. A great mistake has been made by many writers on this subject because they have neglected to take into consideration the various ligaments which enter into the joint, and have considered only the condyle and glenoid fossa. While the condyle and glenoid fossa are important, they cannot be considered as making up the entire articulation; they are but secondary in importance when the various movements of the parts are considered. The shape of the condyle and glenoid fossa depends

upon the contact points and cusps. Intimately concerned with the cusps and contact point in the shaping of the condyle and glenoid fossa are the ligaments, the capsular, spheno-mandibular, and stylo-mandibular. As the active factor in this mechanism we have the muscles of mastication, which supply the active force to all of the parts.

In order to follow any changes in growth or evolution, we take a fixed point, one which changes the least under varying conditions. It is a well-known fact that the organs which are developed last change first, and that those parts which are formed first yield to change more slowly.

Bone is one of the first structures to yield to influence, and intramembranous bone changes before endochondral. All bone changes its shape and form before white connective tissue or inelastic fibrous tissue. The ligaments of joints develop before the bony portion, and are less influenced by changes, therefore in the temporo-mandibular articulation we find the condyle and glenoid fossa changing before any of the ligaments change. Again, we find that the changes occur in the condyle and glenoid fossa as soon as in any bone, as they are of intramembranous origin. Even the condyle, according to Hertwic, develops in membrane, and in my limited investigation on the pig embryo I have never found it otherwise, which is contrary to old anatomists. "Even the articular coating of the socket, which is continued on to the front of the articular eminence, is not true cartilage, though resembling it to the naked eye." (Langer.)

The bony portions of the articulation form at a late period as compared to the teeth and ligaments. The teeth are far advanced before the articulation begins to form, except the spheno-mandibular ligament, which is formed around a portion of Meckel's cartilage. The stylo-mandibular is probably formed from the hyoid arch along with the stylo process and the stylo-hyoid ligament. The capsule and the external capsular ligament also develop early from the surrounding connective tissue. All of these ligaments are white inelastic connective tissue firmly attached to the bone, and will permit of no stretching. Any force exerted on them will result in change in the bone to accommodate the conditions arising. Fig. 1 shows the relation of the condyle to the articular eminence and glenoid fossa in normal occlusion. It shows the relation of the bony parts, and a beautiful curve existing between the glenoid fossa, the articular eminence, and the condyle. However, we cannot take the bony joint, as we find it, as the all-important structure, for it developed as a result of forces working upon it. Neither can we say that the condyle, glenoid fossa, and articular eminence were the guiding factors in the movement of the mandible. The movements of the mandible may be compared to a body suspended by ropes or cables (the ligaments) moved by force from other cables (the muscles). The extent to which the

Fig. 1.

supported body (the mandible) will move depends upon the length and attachment of the supporting cables (the ligaments), governed by the force exerted by the other cables (the muscles). If this supported body moves far enough in a certain direction, it will be guided by certain grooves (the cusps of the teeth) and rest at a certain point; therefore the bony portion of the articulation guides the movements of the mandible very lit-

Fig. 2.

tle. We find differently shaped condyles, glenoid fossæ, and articular eminences only because we have different arrangements of the cusps and contact points. Call it occlusion, mastication, jaw movements, or whatever we like, we eventually get back to the cusp and contact point as the guiding factors.

In Fig. 2 the external portion of the capsular ligament is seen. "The fibers run downward and backward from the tubercle on the zygoma at the outer end of the articular eminence, to the outer side of the neck, as far back as the hind border." The above fibers, termed the external lateral ligament, are so intimately associated with the capsular membrane as to form part of it. The capsular membrane, also called the capsular ligament, surrounds the cartilaginous portion of the condyle, glenoid fossa, and articular eminence, and with the external lateral ligament, governs the distance which the condyle can be forced backward or laterally. The distance which the condyle can be forced backward is very slight, yet there are no bony structures to prevent it. The parotid occupies the back part of the glenoid fossa, and back of that we find the tympanic plate and anterior wall of the auditory canal. These delicate structures have led some to point out the danger of forcing the condyle backward through the tympanic plate against the arteries and nerves, which may cause all kinds of serious trouble. That such a result might occur is shown by the examples cited of luxation of the mandible of long standing, where the condyles have been forced back to their normal position, and it has of course been assumed that a similar displacement of the condyle could result from pressure in class III cases. However, a study of the arrangement of the capsule and external ligament shows that they are arranged to prevent a backward displacement. The inelastic nature of the ligament and the fact that all of the bone will change as a result of pressure before the ligaments will, render the backward displacement impossible. As the ligaments will not change before the bone, how can we get a backward displacement? There may be a change of the bone within the capsule, but the length of the capsule and external ligament remains the same. The condyle may assume a different shape and the articular eminence be absorbed, but the relation between the origin and insertion remains the same, and the position of the fibers and ligament renders their backward displacement impossible. I have before stated that the bony portion

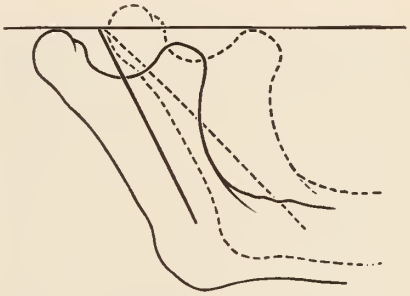
of the temporo-mandibular articulation has little to do in guiding the mandible, and what little it does have is only because the parts have so formed as a result of the demand of the cusp and contact point. Moreover, such changes as occur can only be produced in accordance with the ligaments. Fig. 3 shows the spheno-mandibular ligament, which is attached on the inner border of the ramus at the same level as the stylo-

Fig. 3.

mandibular is attached. The direction of these ligaments corresponds somewhat to the fibers of the internal pterygoid, while the direction of the fibers of the external ligaments correspond somewhat to the fibers of the external pterygoids. This allows certain movements of the mandible to which I will call attention later.

If the importance of the attachment of the ligaments and their inelasticity has been grasped, the conclusion is reached that the temporo-mandibular articulation is not a fixed point. However, there is one point the relation of which remains the same, and that point is the insertion of the stylo- and spheno-mandibular ligaments. It is fortunate that such is the case, as within the "point of fixed relations" the inferior dental nerve and vessels enter the cribriform tube, and are thereby protected. In opening the mouth, the attachment of the stylo- and spheno-mandibular ligament may be taken as the fixed point, or the point least in motion. The condyle travels downward and forward, while that portion of the ramus below the point of least motion travels downward and backward. The stylo- and spheno-mandibular ligaments assume a more perpendicular direction as compared to the downward, forward, and outward

Fig. 4.



direction which they have when at rest. During the act of grinding and protrusion of the lower teeth, the meniscus or articular cartilage, which is not a true cartilage, allows for various accommodations which must take place between the condyle and the surrounding parts. If the mandible is protruded to any great extent, the lower attachment will of necessity be carried forward, which will have the effect of lessening the perpendicular distance between the origin and insertion of the ligaments. This will force the condyle upward against the meniscus and articular eminence. If the mandibular ligaments would stretch, the result would be different, but being inelastic, the change which takes place can be shown diagrammatically, as in Fig. 4. The horizontal black line represents the origin of the mandibular ligaments, the slanting line the direction which they

take, and the mandible, ramus, and condyle are also represented. Now, if the mandible be protruded, the ligaments, as the lower border, will be carried forward, which will produce the results shown by the dotted lines and angles. The condyle will be carried upward against the meniscus and articular eminence. This produces a series of changes which can be followed in class II and III cases, which make interesting study and tend to show that the ligaments play a greater part in these cases than was formerly thought.

I will now leave the study of the temporo-mandibular articulation, and pass on to the cusp and approximal contact point. The various shapes of the articulations which I will show have resulted from some particular shape of the cusp and contact point. I will now make a series of statements which I have never seen in print, although they may have been worked out long ago.

(1) The length of the cusp has a certain relation to the depth of the glenoid fossa. If the cusp be high or long, the glenoid fossa will be deep and the articular eminence prominent. If the cusp be short, the glenoid fossa will be shallow and the articular eminence inconspicuous.

(2) The direction of the greatest diameter of the tooth will be the reverse of the greatest diameter of the condyle. If the diameter of the tooth be greatest mesio-distally, the greatest diameter of the condyle will be bucco-lingually. The reverse will also be true. If the diameters of the tooth are equal, you will find a similar condition in the condyle. If the condyle be of a certain shape, the glenoid fossa must of course correspond.

(3) As the length of the cusp increases, the surface of the approximal contact decreases; also, as the cusp decreases, the surfaces of the approximal contact increases. This is found to be true in all animals, and the changes will be found to take place in the life of every individual.

With these statements in mind, I will show a number of slides made from specimens of comparative anatomy. Some are taken from my own collection, some from that of Dr. Thompson, and some from the American Museum of Natural History, New York. They tend to prove my statements as regards the relation of the cusp to the contact point and the influence of both upon the temporo-mandibular articulation. I will subsequently show some human skulls and note some changes that have taken place in them, two specimens being the property of Dr. Cryer, who has kindly consented to their being used in this paper.

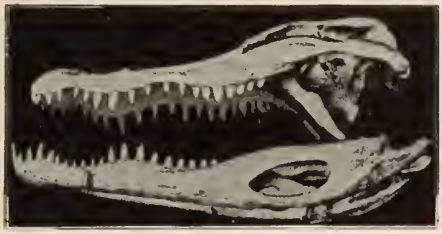
Fig. 5.

Fig. 5 shows the jaws of a shark. It is exhibited because the cusps, contact point, and temporo-mandibular articulation are unspecialized in development. The jaws are in a cartilaginous state. It always seemed to me that in the jaws of the cartilaginous fishes conditions exist which we would find in the mammals if development stopped progressing and Meckel's cartilage remained the supporting structure of the teeth. We find no

well-developed condyle or glenoid fossa, but the ligaments and the group of muscles which form the important structures in higher animals are present. From the dentition of the shark it would be possible to form any of the jaws and teeth of the bony fishes which are found higher up in the scale of evolution. The teeth are but slight modifications of the dermal scales, and as a result of evolution or, more correctly, mutation, many shapes will occur.

Fig. 6.

a



b

Fig. 6, taken from Dr. Thompson's "Dental Anatomy," shows the dentures of a crocodile and an alligator. There are a great many interesting specimens that we are forced to pass before coming to these and similar reptiles. I have chosen them because they have shown a development not found in any other living order that I have examined. The teeth are of conical shape, and are used as a strong argument in support of the theory of the fusion of the cusps. While the teeth if taken singly are not sectorial, they are so if taken collectively, as can be testified to by anyone who has been so unfortunate as to come in contact with the jaws of one of these animals when it was not in a friendly mood. The "cusps" are long and the contact is slight, in fact, so slight that the approximal contact is absent. The jaws have the same movement that we find in the carnivora, but the temporo-mandibular articulation is different. The "glenoid fossa" is on the ramus, where the condyle should be, and the condyle is where the glenoid fossa is situated in higher animals. The change makes it possible for the animal to open the mouth. The animal being of short stature, its head is always close to the ground, and in opening the jaws the mandible remains practically stationary, and the maxilla and skull move. This gives the animal the appearance of throwing its head back every time the mouth is opened.

Fig. 7.

Fig. 7 shows the skull of a hippopotamus. We find that the anterior teeth have ceased to be of much use as organs of mastication, and they are used as shovels. The grinding teeth are premolars and molars, which are of almost equal diameters. As a result of this we find the condyle to be of almost equal diameters, the glenoid fossa to be shallow,

and the articular eminence indistinct. The cusps are short, and the approximal contact points of the teeth are broad surfaces.

The antelope (Fig. 8) is another animal which presents a very interesting study. The picture shows the occlusal surfaces of the teeth. It must be borne in mind that the lower jaw is the reverse of the upper, while in the figure it, of course, appears to be the same. The incisors are present only in the lower jaw and play but little part in the shaping of the temporo-mandibular articulation. The molars and premolars are the more important teeth. It will be noticed that the teeth are large in all directions, but the mesio-distal diameter of the entire set is greater than the combined bucco-lingual diameter. The measurements of the condyle and glenoid fossa are just the reverse. The teeth and cusps are so shaped that, in order that the teeth may perform their function properly, they have to travel a great distance. As a result of this, the cusps would give little support in maintaining the teeth in normal occlusion, therefore the teeth are supported by the interlocking of the approximal contact points in such a manner as to overcome the forces of the muscles during mastication. Observe how each disto-buccal corner in the upper teeth is caught under the mesio-buccal corner of the one posterior to it. In the lower denture the reverse is true; the mesio-lingual corner of each tooth is caught under the disto-lingual corner of the one anterior to it. The upper teeth are braced on the buccal sides, and the lower on the lingual sides. This bears out the statement that "as the length of the cusp decreases, the approximal contact increases." In this case we have the contact points of the teeth developed into surfaces which are locked to overcome the stress placed on the cusps during mastication. The condyle and glenoid fossa have been shaped to conform to the cusp and contact point. The following slides, taken from a series of specimens in the American Museum of Natural History, will show the different conditions found in the horse at various ages. I am sorry that I cannot show the same specimen at different ages, but, as yet, I know of no technique whereby that can be accomplished! Therefore you must be content to see what is the normal for any particular age.

Fig. 8.

Fig. 9.

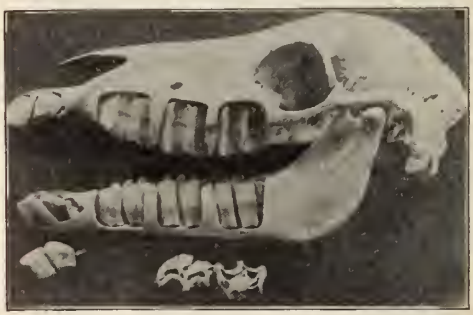


Fig. 9 represents the skull of a horse at the tenth month of fetal life. The

enamel organs are not completely developed, the teeth are developed in advance of the temporo-mandibular articulation. It will be observed that the bones in the proximity of the temporo-mandibular articulation are not completely formed. The zygomatic portion of the malar and temporal bones is but partially united and the orbital portion of the frontal bone is in an uncompleted condition. The condyle has not assumed any definite form, and there is no articular eminence.

Fig. 10 is taken from a specimen of three years and six months. The deciduous molars are being shed, and the permanent molars are erupting. The contact of the permanent teeth is but slight, as a well-defined approximal space between them can be seen. The great difference is noted in the temporo-mandibular region. The zygomatic arch and the orbital portion of the frontal bone are well formed. The condyle has taken a different shape from what it had in the fetus. There is no trouble in making out the articular eminence now. Why this difference? Because the forces of occlusion, through the cusp and contact point, have been active for three and one-half years. The illustration Fig. 11 is taken from a male horse of five years. The parts are longer and the permanent molars have taken their positions with the proper amount of approximal contact. Notice the position which they occupy and the amount of tooth surface from the second premolar to the last molar. I have said that certain changes take place in the temporo-mandibular articulation, cusp, and contact point during the life of the individual. In Fig. 11 we have what might be considered the normal. Fig. 12 shows a great many changes to have occurred. The cusps have been worn down, and as a result there is a broader approximal contact point and one that is arranged differently. As the cusps have been worn down the teeth have become narrower, the distal molars have moved forward, and the anterior premolars have moved backward. The first molar and the

Fig. 10.

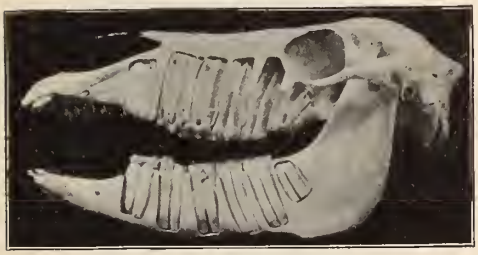


Fig. 11.

Fig. 12.

fourth premolar have about maintained their natural position, while the rest of the teeth have changed theirs so as to produce a greater locking of the contact, and the teeth have therefore remained in the proper line of occlusion. As the cusps lost the locking influence, a greater locking of the contact points occurred by a change which brought different surfaces of the teeth together. It will be noticed

Fig. 13.

that the occlusal surfaces of all the teeth are not as great as in Fig. 11. This proves that in the horse there are definite changes which come under the three statements made in a previous portion of this paper.

We have considered certain of the herbivorous animals, and have seen that a relationship exists between the cusp, contact point, and temporo-mandibular articulation. It may be objected that "That is only one order." We will now pass to one of the rodents whose dentition is very similar to that of the entire order. It will be remembered that it was the molars of the herbivorous animals that were the more constant, as not all of them have a complete dentition of incisors. In the rodents, the incisors are the teeth which have really distinguished them from the other animals, for the molars may show radical differences, but the incisors are characteristic. They have been known by their scalpriform shape, as described by Owen. As a result of such teeth, the temporo-mandibular articulation has assumed characteristic features. I do not mean to contend that the molars have not played any part, but their influence has been of secondary importance, and the

Fig. 14.

changes which they have produced have not interfered with the incisors. These incisors are long and scalpriform, suited for gnawing. It is upon these teeth that the animal depends for a living. These teeth are wide in the bucco-lingual direction. It would then be expected that the condyle has the long diameter in the other direction. By looking at Fig. 13 it will be seen that such is the case. The glenoid fossa is almost a deep groove in which the long (antero-posterior) condyle slides. The front view (Fig. 14) shows almost total absence of an articular eminence, for the condyle is clearly visible. In order for the molars to be brought into use, the mandible has to be thrown to one side to a great extent.

This is made possible by the manner in which the mandibular ligaments are attached. In attempting to get the mandible to occupy the proper position to the upper teeth in a prepared skull of a rodent, one is forced to conclude that it is the ligaments more than the bony articulation that guided the mandible, which is true—but the cusps and contact points are the real guides to the mandible. Fig. 15 shows the palatal view of the same specimen. Note the very small bony glenoid fossa; the real "fossa" that gave the support to the condyle when the mandible was moved by the powerful muscles of mastication was the capsular ligament and the mandibular ligaments. I would call attention to the fact that the condyle possessed a long diameter which was in the opposite direction to the long diameter of the occlusal surface of the incisor. It will also be noticed that the long diameter of the occlusal surface of the molars and premolars is in the opposite direction to the long diameter of the condyle. The cusps of the teeth of the rabbit are very short, but it is noticed that the contact of the approximal surface is broad. The contact is much greater than we find it in the carnivora, which are many times larger. In order to demonstrate that the shape of the condyle is dependent upon the shape of the tooth and not upon the order or family, I will show another rodent (Fig. 16), which has a differently shaped tooth, one that is larger in the opposite direction from the tooth of the rabbit. The different shape of the molars and premolars and the corresponding difference in the condyle will be at once noticed, yet it follows the same rule. The shape of this condyle should be remembered, for this animal (the beaver) uses the incisors extensively, and the diameter of these teeth bears a very close proportional relation to the diameters of human incisors. This being the case, one could expect a human being to develop a condyle that would have the appearance of the condyle of a beaver, if the teeth were used in a similar manner. I

Fig. 15.

Fig. 16.

shall therefore show, later, a human condyle that resembles a beaver condyle very closely.

The kangaroo (Fig. 17) possesses a very remarkable dentition, yet one that conforms to all of the rules laid down above. The peculiar arrangement of the incisors, six above and two below, immediately attracts attention. At the symphysis there is only a fibrous union of the halves of the mandible. The lower incisors grow directly outward in a horizontal direction, with the cutting edges toward the median line. This gives them the same relation to each other that the blades of scissors bear. The condyle has a long diameter bucco-lingually, while the teeth—molars and incisors—have their long diameter in the other direction. From the outer surface the condyle slants downward and inward. The muscles and ligaments are so attached that the condyles move in such a manner as to produce a scissor-like motion of the incisors. I believe that if the lower incisors of the kangaroo were extracted and the animal were forced to a greater and different use of the molars, we would find a radical change in the shape of the condyle and glenoid fossa, although the glenoid fossa in the kangaroo is more of a surface than a fossa.

Fig. 17.

Among the carnivora, we have the record of one animal that possessed a tooth almost as highly specialized as the lower incisor of the kangaroo. I refer to the extinct cave-tiger. (Fig. 18.) The canines were so highly developed and attained so great a length that a special arrangement of the temporo-mandibular articulation had to take place in order that the jaws might be opened. The arrangement of the mandibular ligaments was different from that in living tigers, and the attachment of the muscles was such that the animal could drop the mandible sufficiently to expose those large canines. Some species may have used those teeth as weapons of warfare with the jaws closed, but even then it would be necessary to open the mouth to obtain food. However, from a study of the jaws, it appears to me that the extinct cave-tiger used his teeth but little differently from his living cousins. We have here an undisputed example of the temporo-mandibular articulation being influenced by the cusps. The approximal

Fig. 18.*

* [In this reproduction, owing to the outline given to the background, the skull does not appear in the intended position, which is found by making the upper left corner the highest point of the picture.]

contact of the teeth is slight, as it is in the living carnivora. I cannot say that the modern tigers were evolved from the cave-tigers, but the difference in the temporo-mandibular articulation is the difference in the canine. By that I mean that the length of the canines was the influence which caused the type of articulation which we find in the cave-tiger, and which is producing the type found in the present animal. Fig. 19 represents one of your Colorado inhabitants, a specimen prepared by your townsman,

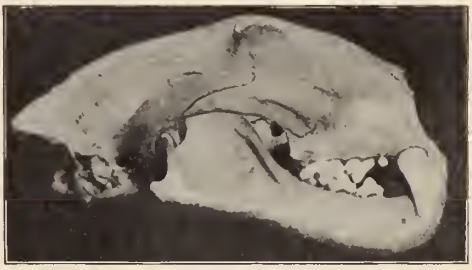
Fig. 19.

Dr. Ketcham. The canines would place this animal in the class of carnivora without a question of doubt. They are much shorter than those of the cave-tiger, yet they are long enough to produce a distinct type of temporo-mandibular articulation. The rule given, viz, that with a long cusp a deep glenoid fossa and condyle are associated, to correspond with a well-developed articular eminence, is well proved here. On looking at the occlusal surface of the teeth of the mountain-lion (Fig. 20), the deep glenoid fossa and articular eminence are noted. Along with the canines, the premolars of the carnivora play a prominent part. The cusps are long and high, and the teeth have the greatest diameter in the antero-posterior direction. Teeth with long cusps have small contact points. There is no use for

Fig. 20.

a large contact point to hold the tooth in the line of occlusion, as the cusps render it impossible for the teeth to get out of place. Even in the case of the bulldog, with its protruding lower jaw, the teeth are by no means as far out of occlusion as

Fig. 21.



one would think until several have been examined, yet if a child suffered from pathological conditions such as the bulldog presents, the deformity would be extreme. So in the carnivora; we find less contact, approximally, than in any other animals, as, for instance, in the mountain-lion, which exhibits less contact than the small rabbit, as has been shown

before. In Fig. 21 we have the side view of the same animal. Note the difference between this specimen and the cave-tiger. The mountain-lion could not open the jaws to nearly the distance which his extinct cousin could. This illustration also presents a good view of the relation which the width of the condyle bears to the molars.

For the purpose of comparison, I have photographed the skulls of a bear and a hyena together. They differ from the carnivora in several respects. The result of the muscles of mastication, cusps, and approximal contacts is clearly shown. The bear (upper skull, Fig. 22) has much shorter canines, a greater number of teeth, shorter cusps, and greater approximal contact than the carnivora. The condyle is broader, the glenoid fossa less deep, and the articular eminence less prominent. If we could only see the teeth of the bear and the lion, we could describe the temporo-mandibular articulation of each and tell wherein they differed. The hyena (lower skull, Fig. 22) is more like one of the true carnivora than like a bear. The teeth are shorter than the lion's teeth, but much broader at the base. In other words, they are much stronger. As a result of a different diet the hyena has larger, stronger, and shorter teeth. His teeth, with the heavy muscles that develop, enable him to live on the carcases which the other animals leave. The temporo-mandibular articulation is also built to support the strong teeth as a result of the use to which they are put.

Fig. 22.

Fig. 23.

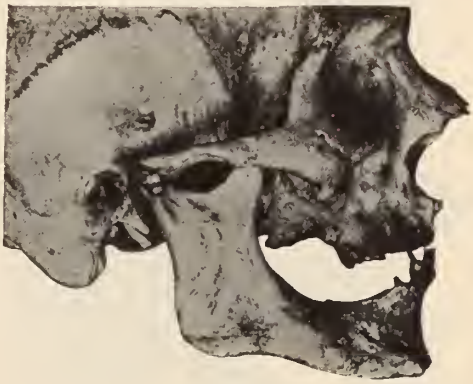
Attention has been called to the temporo-mandibular articulation of the cave-tiger and the mountain-lion. These differences I attributed to the difference in the development of the canines. That a single tooth will produce a certain change, I am sure. To further substantiate my claim, I will show the skull of a Mexican wild hog, which is agreed by all to be closely related to the domestic hog, and a "half-brother" to the Arkansas razor-back. In the wild hog (Fig. 23) the canines always develop and are very dangerous weapons. Hunters are very careful to keep dogs away from wild hogs, owing to the damage one hog can accomplish in a single charge. As a result of these long canines, we have in what is otherwise an herbivorous animal a condyle and glenoid fossa, in fact, a complete temporo-mandibular articulation, similar to that in a carnivorous animal. The food and other habits are practically the same

as in the Arkansas razor-back, but for some reason a different dentition appeared, and the resulting changes occurred in the temporo-mandibular articulation. In the domestic hog (Fig. 24) we have the flat condyle and glenoid fossa characteristic of the herbivorous animals. In both the domestic and the wild hog we have the proper cusp and contact point relations, proving the influence of one upon the other.

Fig. 24.

The various examples shown have led me to believe that it is the teeth that are responsible for the formation of the temporo-mandibular articulation, and that a definite result will be found in a tooth of a certain shape. There also exists a relationship between the length of the cusp and the contact point. In regard to the relation of the cusp to the approximal contact in man, I will say but a few words. I am sorry that I was unable to obtain slides, but the points are clearly understood without illustrations. In the teeth that are in normal occlusion and are not worn down, we find a beautiful interlocking of the cusps, which have considerable length. The contact point is small and situated at a considerable distance from the occlusal surface of the teeth. We also have the upper incisors overlapping the lowers, forming what is known as the overbite. In the normal occlusion the length of the overbite is the length of the buccal cusps. As the teeth are worn down, the incisors should be worn the same as the molars and premolars. Along with the wear on the cusps we have a wear of the entire occlusal surface, which results in the contact being nearer the occlusal surface than it formerly was, so that broader surfaces of the teeth are brought together in approximal contact, and we have the rule worked out again, *i.e.* as the length of the cusp decreases, the width of the approximal contact increases. I showed this in the adult horse, and it can be observed in all old people. Dr. Thompson first called my attention to this when he was preparing his paper on "Jumping the Bite in Senile Abrasions."

Fig. 25.



I will show a few mandibles with condyles that have changed as a result of the cusp and the contact point. The first illustration (Fig. 25) shows the right side of a specimen owned by Dr. Cryer, who has kindly consented to my using these slides. I have never seen this skull, but the temporo-mandibular articulation appears to me as if it were

near the normal. Notice the shape of the condyle and glenoid fossa, and the relation which the posterior portion of the condyle bears to the styloid process and the auditory meatus. We have a well-developed articular eminence. I want to again call attention to the diagram in Fig. 4, in which I tried to show how the ramus would be carried forward in the protrusion of the mandible. The ligaments also would cause the condyle to bear against the articular eminence.

Fig. 26.

In occlusion, the jaw is thrown to one side, as can be seen on the left side. (Fig. 26.) The ramus is farther from the styloid process. It looks as if the distance from the condyle to the lower border of the ramus is less in Fig. 26 than in Fig. 25. The condyle has been rebuilt on the left side and a portion has been added on the posterior border, so that the difference from the posterior border and the external meatus is not as great as the differences between the ramus and the styloid process. The capsular ligament has remained the same. In order that the condyle might be protruded, the articular eminence has been absorbed. So it is seen that the temporo-mandibular articulation has changed as demanded by the tooth, and that it has been the bone that has changed and not the ligaments, proving to me that

Fig. 27.

we can always expect a change in the bone before any of the ligaments change.

The condyles of this mandible (Fig. 27) have developed equally, as the teeth on both sides were used to an equal extent. As the subject was of advanced age, the teeth were well worn down, which accounts for the flat appearance of the condyles. Of the three rami shown in Fig. 28, the one at the back

Fig. 28.

of the row is shown in Fig. 27. The two rami in the foreground are taken from mandibles in which the teeth have not been used to the same extent on both sides. The side views show little difference, but a remarkable difference can be seen from the rear. In the mandible in Fig. 29, it is seen that the con-

dyle on the left side is much flatter across than the one on the right side. The left ramus is also shorter than the right. The cause of these differences in the

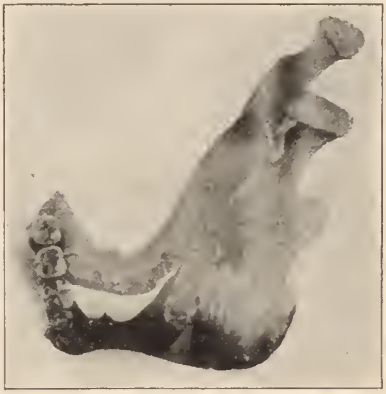
Fig. 29.

condyles is the arrangement of the teeth. Owing to the loss of some of the teeth in the upper jaw, the mandible always swung to the right, which resulted in the left condyle being the one that trav-

Fig. 30.

eled. The right condyle remained as a pivot upon which the mandible swung; more than that, the extreme right side of the right condyle was the pivotal point. The results can easily be seen. From the numerous passages of the left condyle over the articular eminence, the condyle and eminence were worn down. If man would cause the mandible to follow the paths that the mandibles of the lower animals describe, the temporo-mandibular articulation would assume the same character. The changes which we find in the left condyle and glenoid fossa are the result of the continued travel of the condyle, made necessary by the arrangements of the cusps, and prove

Fig. 31.



the influence which the teeth have upon the articulation. The mandible (Fig. 30) in the foreground of the three specimens shown possesses condyles which have changed in the same way as those in the one just shown, except that the

Fig. 32.

right condyle is the one which has traveled the greater extent; also the patient was not over sixteen years of age, which accounts for the smaller amount of change. The trouble that caused the un-

natural movements of the mandible is an impacted second premolar.

In the picture of two condyles, the other side being the same, shown in Fig. 31, the lower condyle is normal. The teeth have been used as the teeth of man should be, and there has been an equal development of all the parts. The upper condyle is much narrower. The subject was forced to do all the masticating upon the anterior teeth. This resulted in changes taking place in the condyle until it resembles very much the condyle of the beaver. The cause of this resemblance is that the beaver uses the anterior teeth extensively, and the owner of the upper condyle acquired the use of the front teeth from necessity. The side view (Fig. 32) shows to what extent the abnormal condyle has developed in the anterior posterior direction, resembling again the condyle of the rodents, in which the diameters of the condyles are more nearly equal.

After all these examples, one cannot fail to recognize the influence which the teeth exert upon the development of the temporo-mandibular articulation, and the relation which the cusp and the approximal contact point bear to each other.

Discussion.

Dr. Richard Summa, St. Louis, Mo. I cannot pass this paper without extending my personal thanks to Dr. Dewey for his carefully prepared presentation of this subject. There really is not much to say, except that Dr. Dewey has added another fact to support the statement that the development and growth of the jaw is dependent upon the teeth. I have stated on previous occasions, and risk repetition here, that the old fallacious idea that the tooth is dependent upon the jaw must be banished. We formerly heard much about there being too many teeth in the jaw and that the jaw was too small for the teeth, while in reality the growth of the jaw is a response in every particular to the growing and functioning teeth.

Dr. Dewey has laid great stress upon the fact that the temporo-mandibular articulation, of which we know comparatively little so far, greatly depends upon the number, function, and shape of the teeth.

Dr. Dewey. There is nothing more that I care to add.

Adjourned until Wednesday evening.

WEDNESDAY—Second Session.

The section was called to order at 8 p.m. by Dr. Burton Lee Thorpe, the president, who introduced the chairman of the evening, Dr. E. P. Dameron, St. Louis, Mo.

Dr. Dameron. It is with great pleasure that I now introduce to you the first speaker of the evening, Dr. W. A. Evans, commissioner of health of Chicago, who will address you upon the subject of "The Teeth and Health in Their Public Relations."

Dr. Evans then read the following paper:

The Teeth and Health in Their Public Relations.

By W. A. EVANS.

Less than twenty years ago there was no community planning in this country. Society was intensely individualistic; our country was so vast and migration was so easy, opportunity was so great, and the feeding-stream of strong European blood so abundant, that there seemed no need of any policy save that of community drifting. Now the soil is occupied; in most sections the cream is gone from the soil. We are ceasing to be a nation of farmers, each with a vast amount of room, and are becoming a city nation, with some 10 to 1000 persons to the acre.

Something for nothing is unthinkable. If we are to enjoy the greater opportunities for manufacture and trade, for art and education, which our latter-day methods afford, we must pay the price. A part of that price is a proper regard for health. Furthermore, we are an extravagant nation; nearly everything in our life for the last century has exaggerated our tendency to extravagance. One of our extravagances has been leaving things to be cured rather than preventing them. We build flimsy houses, carry insurance at a prohibitive rate for ten years, and then see them burn and lose half the value. We indulge our liberty and license and pay for it in murders, in crime, and in the most expensive police system in the world. The limit has been reached; the senses are sobering, and the day of community planning is at hand.

Dentists were isolated and individualistic. As doctors were attempting dental work which they were not trained to do, it became necessary for you to orient your profession in order that there might be a proper development of your art.

In orienting your art, you oriented yourselves, and you have become too individualistic and too isolated for either your own good or that of society. As you looked into a mouth, if perchance you saw past the collar-bone you were in an undiscovered wild; and, on the other hand, the medical man searching for the cause of sub-infections in enlarged glands would look past hollow teeth with eyes all unseeing. A dentist who is not a good doctor, in philosophy and mental scope, is not a good dentist. A doctor who is not a dentist in perception is not a good doctor. A doctor who can look at a patient and not see the home, the heredity, the environment back of that patient, is not much of a doctor; a dentist who cannot look back of a tooth defect to the things which have caused it and which it causes, is not a good dentist.

The individualism of the dentist shows itself in your society relations. Years ago your art was an art alone, and every man followed it for himself and by himself; then the craft began to draw together, and societies began to form and grow. They are founded on a utilitarian basis. They will prosper as they plan to serve the dentist and society. Dental societies must concern themselves with every detail of the life-work of the dentist. When they get on

this basis, every reputable dentist will belong to them, and the percentage of reputable dentists will materially improve.

They must do more; they must plan for a fulfilment of the public relations of dentists. You cannot assume a function of society without assuming its duties. To speak more concretely, society will not allow you to do its dental work, allow you privileges in connection therewith, without demanding that you see that all dental work is done. You cannot enjoy the honors without assuming the responsibilities. In your individualistic and isolated lives, up to now, you have assumed responsibility in regard to cavities, usually with respect to individuals, and frequently with respect to families. But you have never thought of it with respect to the community. This you must think of, if you are to prosper.

In the juvenile court in Chicago they are inaugurating a dental clinic. Why? Because they have found that 65 per cent. of the children have decayed teeth, and because they know that the percentage of those who will be saved from the streets to useful lives will be increased if the defects are corrected. In the city schools of Chicago we find that 35 per cent. of the children have dental defects. Our percentage is lower than that of the court, because our children are better cared for, and also because we do not look so closely for dental defects as we shall when our machinery for relief catches up with the development of our machinery for discovery. But this discrepancy is not the point here. The point is, Do you believe that the interests of the dental profession will be properly cared for in legislatures, courts, and society so long as 50 per cent. of the children have bad teeth? You understand that people can live with bad teeth. They may have poor, hunted, and miserable lives, but they live. Are these people going to protect the rights of others along lines where theirs have been neglected? Bad teeth do not make business for dentists by serving as horrible examples—or rarely so. But good teeth do stimulate business. You will never have your proper standing in the community until no teeth are neglected, neither those of the rich nor those of the poor; and the community will inevitably hold you responsible for all dental deficiencies. The planning of how to cure this nation-wide situation must be yours, or you must suffer the consequences. So much for that part of the subject which is of self-interest to you.

Now let us look at the subject more altruistically. Any school inspection which embraces a physical examination will show that about 50 per cent. of the children require treatment. The Chicago figures for 1909 show 51 per cent. defective. The tooth defects were 32.3 per cent.; tonsils, 20; glandular enlargement, 12.3; nasal, 4.8; adenoids, 3; hearing, 2. 42.1 per cent. of the defects that were found were either in the teeth or else in structures which functionally are closely related to them. To this we can also logically add a part of the cases of anemia (2.6 per cent.) and imperfect nutrition (2.2 per cent.). The percentage of tooth defects varies much in the reports from the different countries. In Chicago we have but four clinics—and they are very young—to look after such cases, and in consequence thousands of cases are unattended—thousands cannot be brought to private dentists. In consequence, our searching is not as close as it will be when our relief machinery has caught up somewhat with the necessities.

How do bad teeth do harm?

(1) Good chewing is a necessity for good health. The food must be well broken up, and time must be taken to insalivate it well. If the teeth are badly occluded or full of cavities, the grinding will not be well done nor prolonged sufficiently for good insalivation.

(2) Bacteria will enter through and by bad teeth; they will produce subinfections and infections of neighboring lymph glands, causing adenoids, tonsillar affections, and glandular enlargements in the neck, or they will escape these sentinels and cause infections of the lungs or other parts of the body.

(3) In cavities in teeth or around dirty teeth, or in tonsils or adenoids enlarged owing to bad teeth, the bacteria of diphtheria and scarlet fever and similar diseases may linger, to produce what are known as carrier cases.

(4) Through absorption from cavities and bad roots, systemic poisonings result in infections and in malnutritions. These results are rarely demonstrable; occasionally they are latent, chronic, far-reaching, slow-acting, and obscure. The child does not thrive physically, does not grow, does not feel well, is not full of life and energy; it does not learn in school nor develop in spirit. But, you say, what has the community to do with that?

I remember the time when smallpox was allowed to run wild. Now we know that the community right in a case of contagion is greater than is the individual's right to liberty. We now know that communities have consumption as they deserve it, that the community suffers more from consumption than the consumptive suffers, and that the community's right in him, from the standpoint of cause or effect, is paramount. We know that neglected children fill poorhouses and jails and asylums in later years; that they make bad legislators or a bad proletariat behind legislators. The community cannot afford this. If you will read this year's *Survey* you will find an article on cold school rooms in Chicago; you will read how proper physical environment adds to mental opportunities and capacities. I have before me the first report of the Chicago open-air school. There 49 children were taken from bad homes. In 31 of those homes there had been a recent case of, or a recent death from tuberculosis. The aggregate underweight of the children was 615 pounds—or the aggregate weight of thirteen normal six-year-old children. They were several grades behind the regular one for their age. None were cases of open tuberculosis. They went to school on the roof, in the open air, and they gained an aggregate of 178¾ pounds from January 4, 1910, to June 24, 1910, and averaged a gain of two grades in these six months.

Says Mr. Wing: "Some day the city will be judged a success or failure by what it has been able to accomplish for these little ones who never had a chance."

Says Dr. Favill: "This school (maintained by the Cyrus H. McCormick family) has shown the feasibility of giving every child what is its natural right, namely, an education under conditions which foster rather than stifle his physical perfection."

The community must plan to conserve its resources, and its greatest resource is its people. The plans must contemplate the finest physical development. So much of it as is concerned with the teeth is your function; you cannot neglect it and have the community fail to neglect these things. What is the plan proposed?

First there must be public education. This will be accomplished by public lectures in simple, forceful, direct language given by dentists. In addition, you should have a service to furnish material to the newspapers. In our branch of the profession we stood on our dignity and allowed quack doctors to misinform the people. Lately we have abandoned our foolish attitude, and the newspapers are publishing high-grade and accurate medical articles. I think there is some need of this advice for your profession. The health department of Chicago is probably the most rampant medical advertiser in this country. We will be glad to demonstrate our methods to a committee from your association appointed for that purpose. We will be glad to circulate some dental literature for you, and incidentally for ourselves.

As a result of my limited experience, I am of the following opinion as to the necessity for dental work and the methods to be employed in getting it done:

(1) About one-half of all the children in school need dental work.

(2) At the present time not over one-half of these cases can be induced to pay a dentist.

(3) It is the duty of the organized dental profession, both toward themselves and toward the community, (*a*) to make every person able to do so pay for his dental work, and (*b*) to see that no person needing dental work and unable to pay goes without it.

(4) The dental inspection of school children should be a part of the physical inspection, and should be done as it is now being done.

(5) The dental clinics should be in centrally located schools so that the children can reach them by short walks.

(6) A part of the school assembly-hall, screened off or walled off, furnishes a satisfactory workroom.

(7) A record card should show the financial as well as the physical condition of the patient.

(8) The cost of equipment should be from $200 to $400.

(9) The cost of materials used on the average patient should not exceed ten cents.

(10) The usual filling should be made of amalgam or cement, the object being to preserve the teeth until the child has reached a productive age.

(11) Work done should always be accompanied by instructions as to chewing, occluding, and cleaning.

The Chairman. The next paper is one by Dr. Herbert L. Wheeler of New York city, who will address you on "The History of the Dental Hygiene Movement. How Shall Its Efficiency be Increased?"

Dr. Wheeler then read the following paper:

The History of the Dental Hygiene Movement. How Shall Its Efficiency be Increased?

By HERBERT L. WHEELER.

DENTAL hygiene is not the innovation that the public meetings which are being held in its behalf all over the civilized world at the present time would seem to indicate. It has been advocated as far back as we have a history of medicine and surgery; by Asclepiades, who was born ninety-six years before Christ, Cornelius Celsus, also born B.C., and a long list of others—Galen the Roman; Abulcasis the Arab; Guy de Chauliac the Frenchman; Giovanni of Arcoli, the Italian; Ambrose Paré, Rivière, Carlo Musitano, Fauchard, Bourdet, and others, including many of our own early dentists. Eleazar Parmly, dentist, has a book of verses inscribed to him in 1833 by one Solyman Brown, entitled "Dentologia," and here are some of the lines we find therein:

But when from loss of teeth the food must pass,
A crude and rigid and unbroken mass,
To the digestive organs, who can know
What various forms of complicated woe
May rise terrific from that single source?
For nature once resisted in her course
Breeds frightful things—a monstrous progeny!—
Consumption, fever, palsy, leprosy,
The hobbling gout that chides at every breath
The lingering pace of all-destroying death;
And apoplexy, dragging to his doom
The half-surviving victim of the tomb.
See thus the mortal life of erring man
Reduced by vice and folly to a span;
And years of joy allotted him below
Exchanged for fleeting months of bitter woe!

The difference between the hygiene movement of those early days and the present is this: It was taught then by far-sighted men who appreciated its importance, and it was left for the individuals whether they should avail themselves of this teaching or not, for those who taught were only interested in those who had the cultivation, the intelligence, and the financial ability to take advantage of the teaching.

The scope of the present dental hygiene movement has been vastly increased from those isolated efforts of our predecessors because of the economic problems involved. It is beginning to be understood that in a state where enormous sums have to be spent for hospitals, sanatoriums, and general places of recuperation, it may be more economical to prevent the distribution of conditions that make these hospitals and human repair shops necessary than to permit the destruction to occur and attack the question of repair afterward. As an example: I know the superintendent of a very large hospital at which there was a drinking-fountain near the entrance. This superintendent, shortly after having been called to his position at the hospital, observed the various individuals coming for relief stopping at this fountain, and all drinking from the same cup. It occurred to him that it was not impossible that they were manufacturing disease more rapidly than the staff could cure it. Through his efforts arrangements have since been made for the use of individual drinking-cups throughout that hospital, and it is

believed that the amount of good that this institution may do the public has been greatly enhanced because of this simple change.

DENTAL HYGIENE IN THE GERMAN SCHOOLS.

The present movement, then, is an attempt to put within the reach of the masses means of preserving and retaining their natural teeth in such a form as to insure efficient work in mastication, in order to raise the vital standard of the individual. The present industrial growth of Germany is probably responsible for the beginning of this idea in its modern form. In 1885 Professor Jessen of Strassburg established, so far as I know, the first dental school clinic in existence. In 1888 the city of Hanover followed, and then for ten years no more school clinics seem to have been established in Germany; but in 1898 Offenbach and Würzburg established school clinics, and since then, up to the present time, there have been established dental school clinics to the number of about thirty-seven, making forty school clinics in existence in Germany at the present time.

The amount of practical work which it is possible to do in these clinics, it seems to me, is very small compared to the needs, but the education that is accomplished by this practical work is very great.

When we consider that in the city of Berlin, with 225,000 school children, there are at the present time but four rooms and two chairs given to the work of a school clinic, the amount of work that can be done with that equipment is, as we all know, naturally very small; but the amount of influence that is exerted constantly upon the children in that school and other schools in that city is too great to be computed. In Strassburg there are about 20,000 school children. They have a new building in construction, where they will have eight rooms and four chairs in operation. In Hanover, with 32,000 children, there are but three chairs. Dresden, with 65,000 children, has sixteen rooms and ten chairs, but this clinic is a private establishment; Cologne, with 60,000 children, has eight rooms and three chairs; Charlottenburg, with 23,500 children, has six rooms and two chairs, and Frankfort has 36,000 children, with four rooms and two chairs.

So, with approximately from 650,000 to 700,000 children in forty German cities, there are sixty-five chairs. The city that seems to be the best equipped as to chairs in proportion to the number of its pupils is Würzburg, which has less than ten thousand pupils, with an equipment of twenty chairs, the clinic being carried on at the state's expense.

Anyone who knows the time and the painstaking work required to do even a minor dental operation can appreciate that with sixty-five chairs for 650,000 children—one to ten thousand—while an immense amount of practical work can be accomplished from year to year, not even a small proportion of the work needed can actually be done. The great value of this work must be credited to its educational and training influence upon the children. Practically all of the work in Germany is done in co-operation with the boards of education, and if the attempt is to be made to furnish dental service to school children as an economic proposition, the boards of health probably offer the most desirable means of obtaining the result sought.

DENTAL HYGIENE IN ENGLAND.

In England, where the socialistic program has not been so seriously considered and has not attained to the influence that it has in Germany, there has nevertheless been a very widespread movement designed to find out the needs of the masses in regard to dental efficiency, and at the present time there is a decidedly interesting and constant agitation being pressed to obtain these privileges. The most influential factor in bringing home to our cousins of the British Isles the need of dental efficiency was the attempt to secure able-bodied men for the army at the time of the South African war. Men otherwise in good physical condition were incapacitated from going to the field, because of the frightful loss of teeth that abounds in the mouths of the English masses.

There is in existence in England, however, a society known as the School Dentists' Society, and in the introduction to their book containing a statement of their objects and aims, it is said that the question of school dentistry was seriously considered in the United Kingdom in 1885, Mr. W. McPherson Fisher of Dundee, being first to call attention to the dental condition in that country by an excellent paper entitled "Compulsory Attention to the Teeth of School Children." In this paper he contended that the children's teeth should have the same care as other parts of the body, and that every child's mouth should be examined and treated on its entrance into school life, and at least once a year thereafter, by a qualified dentist. For those too poor to pay for dental services, he advocated that dental dispensaries or other aids should be provided. In 1888 Mr. Fisher presented a report at the Dublin meeting of the British Association, and asked for a grant of a hundred dollars to provide for case-books for members of the association to corroborate his statements with regard to the condition of children's teeth. This sum was voted unanimously, and one hundred books were provided, each book permitting of recording fully the details of a thousand cases. In 1889 Mr. Fisher proposed a method by which collective investigation could be carried out through the medium of the branches of the National Association throughout the United Kingdom. A committee was appointed in 1890, and this committee has issued seven annual reports. These reports form a permanent record of what has been accomplished by the British Dental Association throughout the United Kingdom. 12,318 children were carefully examined, and the condition of every tooth in each child's mouth was recorded. Much of the working out of the evidence and the placing of it in statistical form was due to Mr. George Cunningham of Cambridge. Previous to this investigation few of the boys and girls of the poor-law schools of London knew the use of a tooth-brush. Since this investigation, appointments of qualified dental surgeons have been made to many schools, and sanctioned by the Local Government Board, and now the children not only understand the tooth-brush drill, but they start their training for becoming citizens with clean and healthy mouths. Previous to the appointment of these dental officers a large percentage of boys wishing to join the army and navy were refused on account of faulty conditions of the teeth.

The School Dentists' Society was formed to afford opportunities for those who held positions as examiners in schools in England to meet and exchange

views. This society was founded in 1898, and comprises at the present time in the vicinity of seventy members, each one being interested in working in some school clinic. They also have adopted a list of dental charts showing by diagram the conditions in the human mouth, which are utilized for teaching and lecturing.

Unfortunately, my time will not permit me to go into details as to what is being accomplished in England; but they are gradually educating the people to an increased appreciation of the value of healthy mouths and teeth, and a great deal of practical work is being done in that country as well as in Germany. In fact, they have public dental service in about seventy places, so that the work is being carried on there quite as rapidly as in Germany.

DENTAL HYGIENE IN OTHER COUNTRIES.

In France very little had been done up to last summer. As far as I could find out there were few or no appointments of dentists to either schools or hospitals. In Italy nothing has been done; in Holland, Sweden, and Denmark work is being carried on actively, but I have not in my possession any statistics of the situation there.

DENTAL HYGIENE IN THE UNITED STATES.

In this country the first dental clinic that was established—and it is still in existence, as far as I know—is the one at Rochester, New York. Following that, the work may be said to have commenced —although it was not on the program— with the starting of St. Bartholomew's dental clinic in New York. It did not begin to develop in the right direction, however, until the opening of the Fifty-third st. school of the Children's Aid Society, and the establishment of a dental department in Bellevue Hospital. So far as I know the work that has been accomplished up to date in this country has not been done in co-operation with any of the schools, whereas in Europe this seems to be the only avenue through which the work is being carried on.

A very enthusiastic and useful movement was inaugurated in 1908. The Massachusetts Dental Hygiene Council was then organized, which had for its avowed purpose the circulating of literature and other means of information that should supply knowledge to the masses regarding the need of keeping the mouth and teeth hygienic, and how to go about it to obtain hygienic conditions.

Dr. William H. Potter, with students from the Harvard Dental School, examined the mouth and teeth in one of the principal schools in Brookline village, and there obtained a series of records of conditions as they exist, which served as a basis for carrying on this campaign for improved and more intelligent care of the mouth and teeth. But with all the literature that has been produced in Boston, there has been no practical work done, aside from lectures and exhibits, in any of the public schools or hospital institutions, so far as I know; *i.e.* nothing that is directly connected with the organized efforts of the dental societies. In other parts of the country the condition is reversed. The Rochester work is a practical work, a clinic being maintained, which I believe to be the most practical and efficient method of carrying on this campaign of education.

Philadelphia has started the same kind of work in connection with the board of health. Cleveland, through an exhibit

and monster mass meeting, has secured the privilege of making examinations which, I am informed, will be used as a basis for future work. Other cities throughout the country are fast following the lead.

DENTAL HYGIENE IN NEW YORK CITY.

I speak of New York last and separately because I am best acquainted with conditions there, and have been identified with the work from the beginning. New York has succeeded in obtaining the co-operation of about all the forces that may be said to be interested in this work. The Children's Aid Society, which paid the expenses of establishing the first dental clinic in its schools in New York, is a large charitable organization which conducts something like twenty-two schools, where children who are too poverty-stricken to furnish their own clothing are clothed (and sometimes fed) and are furnished with an education very largely along industrial lines—and a very successful program they seem to have, too. They have dental clinics in connection with three of their schools.

The Association for Improving the Condition of the Poor has established a dental clinic in its Sea Breeze Hospital for Tubercular Children. This also is a practical attack made upon this problem. These societies may be said to represent the large charity organizations of New York city—and they are indeed large, some of them handling as high as half a million dollars or more of funds annually. We may be said to have their co-operation.

The city of New York maintains a large number of hospitals. Its chief emergency hospitals are the Bellevue and allied hospitals, which are supported entirely by the city; Bellevue itself has over twelve hundred beds. It cares for all kinds of diseases and of conditions of men—the poor, the insane, and the criminal.

Through the intelligence of its board of directors, and especially through Dr. John W. Brannan, president of the board, it became possible to establish a dental department. It is really called the dental ward, and we have a ward set aside for our purposes and are assigned a trained nurse just as the other wards are. This has brought with it, of course, the co-operation of the officers that represent the city in this gigantic hospital, and we have recently established a dental department at Harlem Hospital, and will, as soon as possible, establish dental departments at Gouverneur and Fordham, all being members of the allied hospitals. The dental staff of these hospitals is appointed on the same terms as the medical, and the work is of a very far-reaching and useful character. Through the Dental Hygiene Council of New York City—an organization which represents the dental societies, and which was established early in 1909 and was organized to assist in directing this work in such channels as will prevent a waste of energy and effort—we also secured the co-operation of the board of health, so that we may depend upon them for any assistance that is within their power, and we have a committee which works in co-operation with health commissioner Lederle. The board of education, also, through the efforts of the Dental Hygiene Council, have designated some twelve schools in New York city, with an attendance of over thirty thousand pupils, which we have been given permission to enter in order to make records of the actual conditions existing in the mouths of the

children in these schools. Thus we have been able to secure the co-operation of all the various forces that might possibly be of assistance in carrying on this work.

There has also been established in New York city one detached clinic, for which a considerable sum of money was secured by Judge Barlow of our municipal court, who became interested in this movement. He has hired rooms and employed dentists, and is doing a great deal of work for the needy poor in the Harlem district, under the direction of a trained nurse who has been associated with the "child hygiene" bureau of the department of health. Just what the final results of detached work of this kind will be cannot be foretold.

COMPARISON OF THE ORAL HYGIENE MOVEMENT IN EUROPE AND AMERICA.

I have been working on this subject for eight years, and as far as my busy life has permitted, I have kept in touch with work of this kind as it is being carried on all over the civilized world. I am convinced that conditions in America are so entirely different from those in European countries that of necessity we need not expect to follow on the same lines along which they are working. In the first place, the conditions of wages there are such that a very much larger proportion of their population are unable to pay for dental services themselves. In the next place, the governments of Europe are and have been accustomed to carry on such matters as affect the welfare and health of the public to a much greater extent than we do here. For instance, our insurance business is done almost entirely by private corporations. The industrial insurance of England and Germany and France is almost entirely in the hands of the government, and the government is accustomed to reserving from the wages of its subjects sufficient to pay for their insurance and other securities. We cannot well introduce that plan here. There is a greater amount of money in circulation; individuals are more generally able to pay for dental and medical services and for insurance, and would, without a doubt, object to having the government deduct or take from their income sufficient to pay for these. If these institutions are to be carried on by the public they will have to be paid for by the public, and the increase in taxes will be enormous. If it can be shown that the economic value of a man who has had his physical needs attended to at public expense is so much greater as to warrant the cost, there will be no trouble whatever in securing the necessary appropriations. But before that can be done, an immense amount of work is to be accomplished by the dentists; and without their co-operation and assistance this work cannot be carried on intelligently, or indeed at all.

PROSPECTS OF THE ORAL HYGIENE MOVEMENT.

The educational department, the health department, the hospital department, and charity associations can all, with certainty, point out that the condition of the mouth and teeth of the masses is truly to be deplored. But the observing and stating of these conditions does not produce a remedy. The remedy can only be secured through the intelligent devotion of members of the dental profession to this movement. It will take some years of careful, intelligent application and research before the dental profession will arrive at conclusions

that may greatly facilitate the work. Meanwhile, all who are interested in this movement may advocate hygiene. It is the fundamental step that is absolutely necessary; but it is one thing to advocate this principle, and another to persuade children to conscientiously and continuously practice it. Physiology has been taught in the public schools of America for years, in many instances the law even prescribing the number of hours which this important subject should be taught annually; and yet, if the statistics on physical welfare that we are now overwhelmed with throughout this country be accurate, there never was a time when eye troubles, ear troubles, throat troubles, and tooth troubles were so great, and when so great a proportion of the public was afflicted with them as the present time. It seems, then, that while all the forces that are being used are valuable and are all contributing toward the desired end, the most practical effort that can be put forth is the development of dental clinics in connection with hospitals, boards of health, and public schools, where this is expedient and possible, or in co-operation with the clinics carried on by the boards of health and charity and hospital organizations. This gives us the necessary machinery for discriminating between those who are worthy, that is, the needy poor, and those who should not receive help. It also brings us in contact with organizations that are equipped to find the needy and the afflicted, and enables us to utilize our energy almost entirely along the lines of repairing damage that has already occurred, and educating the public to realize the necessity of more intelligent and personal care in the future.

Of necessity, before the various departments that I have mentioned can set about carrying out the movement of dental hygiene in a successful way, they must have reliable information upon conditions as they actually exist. This reliable information can only be secured through the intelligently directed efforts of the organized dental profession. Boards of health, despite the best of intentions—and I certainly have no desire to reflect upon these useful bodies—are not equipped to make accurate dental examinations nor to draw conclusions from their examinations, if they were made intelligently, as to the probable result of the conditions of the mouth upon the individual's welfare.

Much has been done through the press and various other means of publicity to demonstrate to the public its need, and this will without doubt bear fruit. But in order to secure relief from present conditions the work must be intelligently directed, and I believe it cannot be thus directed except through organized sources, such as boards of health or of education, or charity or hospital organizations in co-operation with the organized dental profession.

The CHAIRMAN. I take pleasure in introducing Dr. W. G. Ebersole of Cleveland, Ohio, who as chairman of the committee on Oral Hygiene, has taken the lead in this movement on behalf of the National Dental Association.

Dr. EBERSOLE then read the following paper:

A Report of the Work Accomplished by the National Dental Association Oral Hygiene Committee.

By W. G. EBERSOLE.

The most important obligation of the dental profession today is to teach the people of America, aye, the world, the proper use and care of the mouth and teeth; their second and most difficult obligation is to teach the rank and file of its members to instruct the people.

Ten years ago the first oral hygiene committee of the National Dental Association was appointed. For ten years have the men who served upon your committees fought strenuously to have the dental profession give proper recognition and consideration to the great field of oral hygiene.

Sixteen months ago, when the present committee was appointed at Birmingham, Ala., almost nine years of hard and faithful service had been rendered—and what did we find? Almost every man who had ever been connected with the committee had either become thoroughly discouraged by the action of the association or completely disheartened by its indifference.

Nine years' work for oral hygiene, and only a few isolated sections actively at work, and only two or three of those working with any definite idea of how to proceed! Discouraged and disheartened —why not!

It had been proved that caries or decay of the teeth was the most prevalent disease of modern civilization, 97 per cent. of our school children showing defects and need of care and treatment. Careful estimates show less than 10 per cent. of the public giving any thought or care to their teeth other than extraction. Humanity was struggling along, ignorant as to the great scourge which was sapping so much of its strength and vitality; and why was this so? Because the dental profession was either too "conservative" or too "indifferent" to enlighten the people.

Every oral hygiene worker in the land was either discouraged or disheartened—and he had a right to be.

That was yesterday. What have we before us today? Would that we had the gift of genius to tell you!

Today every oral hygiene man in the land is alive and active, encouraged, enheartened, and even keenly elated over the progress of the past year. Every dental organization in the land that is worthy of being called an organization is either actively engaged in an oral hygiene campaign or planning one, and all dentists, even those in the most isolated corners, want to know more about the oral hygiene propaganda. Every dental journal in the land is devoting page after page to this subject, and the editors are contending for honors in the field. Humanity is awakening to its distressed condition, and is standing with outstretched arms imploring aid; and the public press is deeply interested and is lending valuable co-operation.

What has wrought this great change

in so short a time, when years of untiring effort availed seemingly so little?

The success of the past year's work is due to the fact that the policy of your committee has been changed from a philanthropic one to an educational or economic one. The leaven which had been distributed during the nine years that your committee had been working had been chilled and retarded in its action by "philanthropy"—philanthropy, abhorred by the self-respecting poor, deplored by the middle-class, and despised by the rich. It needed the heat and warmth of education to enable the leaven to work; education appeals to the rich, the middle-class, and the poor alike.

Education, then, is our watchword. It is our battle-cry in the great undertaking before us. Its effect, so far, has been successful, and it promises to be even more so in the future.

Briefly told, tomorrow will show every dental organization in the world working in the oral hygiene field from an educational standpoint. Our governments—municipal, state, and national—will be as insistent upon healthy mouths in school children as they are upon vaccination.

There will soon be not nearly enough dentists to meet the demand. Dental colleges will be taxed to their utmost to prepare men to meet this demand; and, last and best of all, we will have a healthier, stronger, and happier race of people, as a logical result of the teaching of the proper use and care of the mouth.

Whether this comes in five years, or whether we must wait ten years, depends upon the action of the National Dental Association at this time. The eyes of the dental world are upon us; educational centers, great and small, are awaiting with interest the results of our work.

Such is the condition today. What has wrought it? I would that I might speak of the committees of the past, of the pioneer work of Dr. Richard Grady and his four years' chairmanship; of Dr. John P. Corley, who, as chairman for five years and my faithful supporter and co-worker for one year, has made greater sacrifice in time, money, and energy than any other member of the profession. I might tell of sacrifices in time, money, and energy made by the other members of the committee in their unflinching efforts to comply with the demands made upon them. I would that time might permit of my speaking of the members of the Rochester Dental Society, to whom belongs the greatest credit for oral hygiene work in this country; of Boston, where the dentists are doing a wonderful work; of the work that is being done in New York city, and those who are doing it; of Cleveland, where for the first time in the history of oral hygiene work, a complete educational unit or system has been installed on a purely scientific and economic basis. We might speak of the work accomplished in the past year in many centers; but this report must deal especially with the work of the committee of this association.

THE ORAL HYGIENE CAMPAIGN OF THE N. D. A.

Every member of this committee realized that if the association was to be awakened to a sense of its responsibility to humanity, something of a striking nature must be done.

The indifference of the dental profession to the subject of oral hygiene was fully recognized. This indifference was believed to be due to a lack of understanding as to the possibilities of oral

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hygiene. It was believed that this indifference could be effectively overcome and the active interests of the profession secured by a presentation which should demonstrate that when the public understands the possibilities of oral hygiene, it will demand these services at our hands. This could be done only by instituting a national campaign under conditions which would draw the attention of the professional and educational world.

WORKING PLAN.

After careful deliberation your committee agreed upon a plan for a campaign in which the three greatest educational factors in this country should be used in spreading the oral hygiene propaganda —the public school, the public press, and the public platform.

The public school campaign. In the public school, the educational system proposed was as follows:

(1) To make a cursory examination of the mouth of each school child and to send to the child's home a record of that examination, bringing to the parent or guardian a knowledge, perhaps the first knowledge, of a faulty oral condition. We advocate the appointment of one examiner to a school as the best method from an educational standpoint.

There are two reasons for this: First, Johnny Jones may be examined today and takes home a blank; next week his sister Mary is examined and a similar blank is taken home, and the following week his brother Samuel falls into the hands of the examiner, and for a third time the attention of the parents is called to the importance of the mouth in its relation to the health of their children. The second reason is that the frequent visits of the examiner to the school brings to the minds of the children the importance of the mouth and teeth, and the psychological effect is of great value.

(2) To introduce into the schools, when the examiner has finished and the parents and pupils are prepared for them, a system of lectures which explain the purpose, use, care, and treatment of the mouth.

(3) The establishment of the dental clinic, not for the purpose of relieving Mary White's toothache nor for the filling of numerous cavities in the teeth of Jimmie Jones from a philanthropic standpoint, but to make it possible to secure data which will show the value of healthy oral conditions as related to the working efficacy of the child from the economic side of the question.

The value of this system of education is to be made manifest from the school reports of the pupils, preceding and following treatment.

The public press campaign. The public press educational campaign proposed to give to the press and the public information and data which would insure a widespread knowledge of the importance of dentistry to the health and welfare of the human family. This would place dentistry in the sphere where it belongs in the public mind, and forever silence the ridicule that has pervaded the public press when dental topics were discussed.

The public platform campaign. The public platform educational campaign proposed the locating, selecting, and organizing of a corps of lecturers capable of interesting any kind of audience, from a "mothers' club" on through the various organizations up to and including the various committees of the United States Senate.

Last, but not least, it was proposed to

establish a bureau of education and information which should deduce and correlate from the results of the work in the three great departments mentioned—public school, press, and platform—the data necessary to secure the greatest cooperation between the various branches of the work, and thereby make the work in each branch most effective.

Such was the plan proposed and adopted a year ago.

CLEVELAND AS THE CAMPAIGN CENTER.

Cleveland, Ohio, was finally selected because it is the home of a dental society big and broad enough to undertake the steady and long pull which is necessary to the success of such a campaign.

The Cleveland Dental Society pledged itself to make the examinations and to man the six clinics for one school year. This required an activity and interest on the part of the members of that society, which, so far as I know, has never been excelled in this branch of the work. This form of support is the least dramatic of any part of the work, and the most tiresome and difficult to continue. When oral hygiene is a national success, and we wonder why these things were not done long ago, we shall appreciate better than we can now the value of the services rendered by the members of this society.

Cleveland was also the home of a board of education broad-minded enough to grasp the possibilities of oral hygiene as applied to school children and to open the schools, with their 75,000 pupils, to properly accredited efforts in this line. In Cleveland, also, lives the chairman of the educational and oral hygiene committee of the Ohio State Dental Association, Dr. W. T. Jackman. This society has taken an active interest in oral hygiene in Ohio, and has set aside $500 to pay for printed matter and to secure lanterns for illustrated lectures. It has also agreed to furnish the supplies for the clinics. The chairman of the National Committee of Oral Hygiene also lives in Cleveland.

The centering of these advantages in one place—the public-spirited local society, the broad-minded board of education, and the chairmen of oral hygiene committees—made concentration of effort easy. Here, if anywhere, it should be possible to obtain results without waste of effort.

Individual manufacturers pledged themselves to lend six complete office equipments to the work for one year—mark you, *lend* the equipment, not *give* it.

FUNDS NECESSARY FOR LABORATORY RECORDS.

We now had all but the money necessary to the ultimate success of the work. Some may ask why, with the schools to work in, the equipment furnished, a dental society to do the work and another to furnish materials, money should be necessary.

When all these necessaries had been secured, when the examinations were being made and the clinics were in operation, the fact dawned upon the committee that the plan was incomplete; that it was indeed a monument without a capstone. For how could the value of the work be proved, how could its results be made national in scope unless exact laboratory records could be produced showing the physical and mental improvement in a number of cases which had benefited by the institution of oral hygiene?

The more the committee considered this, the more desirable and necessary it seemed that the work should be carried to its logical conclusion by the production, tabulation, and publication of such records. Nothing of this sort has ever been done. All the claims as to the value of oral hygiene are based upon assumptions and deductions; there are no absolute proofs in the form of exact records of a large number of well-authenticated cases.

If, only, a class composed of a considerable number of pupils representative of those most likely to benefit by oral hygiene could be formed and maintained; if laboratory tests of their physical and mental condition could be made before the institution of oral hygiene; if oral hygiene could be established and maintained in their mouths for a considerable period of time; if they could be taught the proper use and care of the mouth and teeth, and if, after a considerable further period other laboratory tests could be made to demonstrate their physical and mental efficiency, the arguments for or against oral hygiene would rest upon a foundation more secure than it had ever before.

Such a class required several things and involved no small expense. The pupils could be had in sufficient numbers, and the attendants at the school clinics were ready to establish oral hygienic conditions; but the laboratory tests, the constant supervision and instruction, the compilation of the resulting data, could not be made without funds—and funds in sufficient quantity were not in sight.

At the meeting of the Executive Council of this Association at Cleveland, November 6, 1909, our plans were explained, our progress was stated and a request for funds made, but on finding that the association had not sufficient funds to meet the expenses of the committee in its work, your committee sought and succeeded in securing funds from other sources sufficient to enable it to carry on its work in a satisfactory manner. After the money had been secured, work on the campaign began.

OPENING OF THE NATIONAL CAMPAIGN OF ORAL HYGIENE.

On March 18, 1910, the opening of the national campaign of oral hygiene took place in Cleveland under circumstances which attracted the attention of the entire country.

In the morning, from 10 to 12 o'clock, five of the six clinics were dedicated and opened by the national, state, and city oral hygiene committees.

At 2.30 P.M. the mammoth "public school" session was held at Gray's Armory. A part of this audience consisted of 2100 school teachers under full pay by the city to attend.

At 5 P.M. the Cleveland Dental Society held its March meeting and banquet, entertaining the speakers and all visiting dentists.

At 8 P.M. the formal opening of the national campaign took place, Ex-governor Myron T. Herrick presiding. Mayor Herman C. Baehr made the address of welcome, Dr. Burton Lee Thorpe, our honored president, responding. The work was reported by your chairman; Dr. W. A. Evans, commissioner of health, Chicago, speaking on the subject of "The Relation of Conditions of the Oral Cavity to the Health and Morals of School Children." Dr. C. W. Wille, as special representative of President Wm. H. Taft, and Dr. H. C. Brown of Co-

lumbus, as special representative of Governor Judson Harmon, reported the attitude of their respective governments.

THE EXPERIMENTAL CLASS.

The lack of educational matter, from an oral hygiene standpoint, was absolutely astounding. We have done and are doing much in regard to supplying this deficiency.

Our greatest and most important undertaking is the experimental class, consisting of thirty-five boys and girls of Marion school (Cleveland), who were selected out of 886 pupils as presenting the worst oral conditions, and upon whom the merit of our educational plan will hinge.

The school record of these children has been taken for six months preceding the beginning of our work, and two psychological tests have been made to show the working efficiency of the children before we begin to teach the use and care of the mouth. They have been furnished with good tooth-brushes and powder, and a dental nurse has been placed over them to see that they follow instructions. Test meals are given to teach them the use of the teeth, that is, how to masticate properly, and the teeth are all to be treated and filled. Enough five-dollar-gold pieces have been placed in the hands of the principal, Miss O'Neill, to give one to each child who proves faithful until the day before Christmas 1910.

Two psychological tests will be made during the season, also during the six months following treatment. The school records will be taken also for six months following the treatment, and from these records it is expected to secure evidence which will show the value of dental service in dollars and cents.

Through information distributed from our bureau between twenty-five and thirty state and local societies have indorsed our work and appointed committees to act as auxiliaries to ours.

It is impossible to overrate the importance of the work done in this class, and of the intelligent and accurate compilation of the data which it will afford. There is an amazing lack of proper educational literature on the subject of oral hygiene, and so far as the committee can learn, there are absolutely no positive data. We are either right or wrong in our belief as to the value of oral hygiene; neither the correctness nor the error of our position has been indisputably proved on a large scale. Here, for the first time in the history of oral hygiene, is a typical class, conducted under laboratory conditions, and with proper apparatus for recording the results. It is not too much to say that in all probability the conduct of the oral hygiene campaign, in the near future at least, will be governed largely by the results exhibited by this class.

CAMPAIGN LECTURES AND OTHER PUBLIC DEMONSTRATIONS.

Eighteen of the dental colleges have been visited by Dr. J. P. Corley, who gave lectures to the students and held conferences with the faculties. Dr. Corley has also visited eight representative Southern cities, met with their local societies, delivered illustrated lectures before public audiences, and conferred with the municipal authorities, health officers, and boards of education. At the Houston meeting of the Southern Branch he succeeded in having one thousand dollars

pledged for the use of their committee for the coming year. He has spent in time, equipment, and incidentals about one thousand dollars, and in traveling expenses and additional equipment, four hundred dollars, three hundred of which sum was contributed by the National committee, and the rest has been paid out of his own pocket.

Dr. W. A. White of Phelps, N. Y., has succeeded in having introduced into the local school a period in sanitation, bringing the young minds in contact with a subject that will aid them in keeping themselves healthy. He reports that Rochester has three free dental clinics, and that the work is being carried on extensively there; also that work is being done in Syracuse, Brooklyn, and New York.

Dr. P. G. White has addressed practically all the high schools in the city of Boston, many of the grammar schools, and a few suburban schools during the school year. Probably no less than eighteen talks were given at church entertainments and women's clubs in neighboring cities and towns. He succeeded in having a chapter on oral hygiene published in the Ritchie-Caldwell "Primer of Hygiene."

So much for the past and present.

Everything done by your committee during the past year has been for the purpose of accomplishing one ultimate end, namely, the placing of dentistry on its proper plane in the minds of the people.

Data and information are being collected which will enable us to go before the world, not with unproved statements, but with statements so backed by facts and figures that no possible question can be raised as to their value. Statements, facts, and figures must be put in dollars and cents, if the American people and the governments which they control are to be reached.

INFLUENCING LEGISLATURE.

A monster publicity campaign has been planned for driving home the knowledge obtained to every corner of the land in the most telling manner. We say that a monster campaign has been planned; we will go a step farther, and say that the foundation has been laid in Washington, and the proposed plan approved by those on the ground.

"A move upon Washington," you say; "why, we have been moving on Washington for years, and have only met with rebuff." Yes, we go to Washington, but not as we have gone in the past. Our method has been to go to Washington, and through Washington reach the people, and in this we hold that we have been making a mistake. We have *reversed the order* in our new method. Go direct to the people with your message; reach your congressman, your senator, at home, where and when he has his ear to the ground to learn what *the people* want. Do not wait until he goes down to Washington and then write to him when he has his eyes and ears trained upon the politician and the trust magnate to learn what *they* want!

First, give us an oral hygiene committee composed of men who are known to be not only in sympathy with the plans and policies of the present committee, but men who will work in harmony, and are willing to do things. And then give us an auxiliary committee of two hundred and forty or forty-five men; five men from every state in the Union who are at the head of local work and known not only to be in accord with the

present policies of the committee, but who are willing and able to do things; men who know or will find someone who knows and is intimately acquainted with a senator or a congressman, and we can thus reach them on their own ground.

Combine the oral hygiene working forces of the country under one head, and have them so organized and their methods so executed that every ounce of energy put forth will bring full value in return. Give us men who are willing to work with and under your main committee, then give us a little time and money, and when we move upon Washington there will be no halting and no uncertainty; everything will move toward a common end, the general welfare of humanity. Governments will then give us that for which we seek—and then, and only then, will every state, every municipal, and every school government be open to us.

FINAL SUGGESTIONS.

Oral hygiene councils should not be composed of and controlled by the members of the dental profession only, but should be composed of and officered by people representing every walk in life, if the most good is to be accomplished in the dissemination of knowledge and data furnished by the profession; and we earnestly recommend that this association take action indorsing our position on this question.

Last, but not least, we would recommend that this association set aside a sum of not less than one thousand dollars, and sanction the raising from state and local societies and from other sources of funds sufficient to build as we have planned.

Indorse the work of the past year and accept and indorse the plans and policies offered for the future, and then give us a committee that will fearlessly and honestly execute them; and we will pledge ourselves that in much less than another ten years every government and every school boy and girl in this land will know and understand the true value of the mouth and teeth, and dentistry will come into its own. Dentistry will stand, as it should stand, fully on a par with medicine, not only in the mind of the public but in rank and recognition by governments.

Too long have we remained idle. The time has come to act, and we must act now, or accept the ridicule of an intelligent people. Let us act *now,* wisely and well, in the interest of the American home, in the interest of the American public school system; aye, in the interest of mankind as a whole, and thus receive the reward that awaits one who has done his duty faithfully and well.

Discussion.

Dr. J. P. Corley, Sewanee, Tenn. Your committee has spent an enormous amount of time and energy in developing and inaugurating the campaign which Dr. Ebersole has just announced in his report, and we are naturally anxious to know the opinion of his audience in reference to its merits. I therefore request those of you who indorse and commend it to signify your indorsement by standing. [Entire audience stands.]

My special work upon the committee this year was done with the dental colleges. I started out to visit the forty-five dental colleges in the United States last winter. I was obliged to pay my traveling expenses out of my own personal funds, but after I had visited four or five of the schools, the hearts of the

philanthropic manufacturers were moved, and a small amount of money was furnished to pay part of my expenses.

We have taken up before the dental faculties the following proposition: First, we want to have the people of our land taught how to take care of their teeth. We cannot get the dentists to do the work, because they are not prepared. This lesson is not taught in the dental schools; not one lecture is given nor is any period of a term devoted to the education of the public, and students, when they are graduated, are not equipped with sufficient information on the subject to stand before an audience and interest them. They do not know how to present the subject of hygiene to an audience, and we want the dental colleges to instruct them and prepare them to teach the people.

Ever since this committee was appointed, ten years ago, we have found this to be the crux of the situation: To get the members who are yearly added to the profession as the product of the schools sufficiently interested, and prepared to do this work. We said to the dental faculties, We want you to prepare your dental students in this work; begin such a rearrangement of your curriculum that you will eventually create a professorship on the subjects of oral hygiene, prophylaxis, and dental education. Every dental student who matriculates with you should be compelled to submit to an inspection of his teeth, and the condition of his oral cavity should be registered. Before he is advanced a grade, his mouth should be again examined, and unless all cavities are filled and his mouth shows an approximately hygienic condition you should not advance him. Under no circumstances should you graduate a man from your school in whose mouth an unfilled cavity or a generally unsanitary condition exists.

But what do you suppose the faculties replied? I will not say all of them, because in some of the schools they have already made some advance in this direction, and are doing what they can. But some of them said, "We can't do it." "Why can't you?" "Because the students will not stand for it." I replied, "Do you require them to wash their hands and comb their hair before they go into the operating room?" "Sure!" they answered. "Yet you tell me you cannot make them brush their teeth!" I do not think I have ever heard intelligent men make such a blunder as that, so far as logic is concerned.

The second proposition was that every student should be compelled to deliver before the student body sometime during his course an illustrated lecture upon the care of the teeth. His professor shall say to him, "This is a mothers' club," or "an audience of school children," and he shall illustrate that lecture by drawings and models and the work of his own hands, and shall be graded on it in the same way as in anatomy, chemistry, bacteriology, and other subjects.

The third proposition is that each student, before he is commissioned to hang his shingle to the breeze, shall be compelled to construct an oral hygiene exhibit suitable for him to keep in his office, by means of which he shall instruct the *clientèle* in the technique of the dental toilet, and he shall be graded on that also.

I do not believe these requirements are unreasonable. We are going to submit them to the faculties again. Four years ago we tried to get a general audience before them, but they did not have time to consider the subject; they were too

busy. I want to say a word in defense of the poor men who constitute the faculties. I know they are having a hard time of it and I do believe that of all the men under the sun who are practicing the profession of dentistry today, the men who spend their hours in instructing students in this profession at a monetary sacrifice of from three to ten times what they might receive for the same amount of time in their offices are martyrs to the cause of science. I have always taken the part of the dental faculties. But I say now, while a member of a dental faculty is generally a good man, he sometimes gets into a rut, and it is so hard to get him out of it; so we want to wake them up, and get them out of these ruts. We are living right now on the very frontier of a new era in science, religion, and everything else. Why should we stand at our chairs wearing ourselves out driving gold into cavities and extracting hopeless molars, when by cleanliness and care we can retain those teeth in a perfectly healthy and sanitary state throughout normal life.

I want to say before I close that I am sincerely devoted to this cause. It is an obsession with me. Perhaps I am foolish for having allowed it to take such possession of me—at least that is what they tell me at home, but I am going to keep at this work until a sufficient number of men join the ranks who have the time, money, and energy to carry on this beneficent campaign.

Dr. E. E. Haverstick, St. Louis, Mo. I wish, first, to congratulate Dr. Wheeler on his excellent paper. It is worthy of consideration. I doubt if everyone on hearing it read fully understood the deep thoughts which it contains.

In the first place, the essayist spoke of the men who took an active part in building up the dental profession, and referred to the fact that they taught a class of people "who had cultivation, intelligence, and financial ability to avail themselves of the teaching," while today we are appealing to those who must be taught and who have no money to pay either for the teaching or for the dental care which they need. Indeed, they have no appreciation of their needs. This fact makes the movement much more difficult than the work of the dentist of the past. We have, however, a foundation to build upon, and it is a solid footing for the new structure.

Dr. Wheeler has thoroughly and beautifully outlined the purpose of the work in this one sentence: "The present movement, then, is an attempt to put within the reach of the masses means of preserving and retaining their natural teeth in such a form as to insure efficient work in mastication in order to raise the vital standard of the individual."

He has shown you how impossible it is, with the present equipment of even the best equipped cities of Germany, to do all the work that is necessary. Still, the examples he gave might be slightly misleading when he says that Berlin, for instance, has 225,000 school children with four rooms and two chairs given up to the work of school clinics. I am sure that the equipment is inadequate, but a large percentage of these 225,000 school children are financially able to care for their teeth. Many of them, however, who are financially able are not giving their teeth the attention which they require. They do not appreciate their teeth as they should, and as they would if they were better educated with regard to the value of taking care of them early in life. So this movement is not only for the indigent but for all.

I do not know what is required with regard to the teeth of a man entering the English army, but the only dental requirement of a man who wishes to enter the United States army is that he must have two upper molars which occlude with two lower ones. If the English requirements are no higher than the United States requirements—and many were not allowed to enter the English army during the Boer war on account of their teeth—then we have a good picture of the horrible condition of the teeth of the English masses. We are very glad, indeed, to hear Dr. Wheeler say that "Qualified dental surgeons have been appointed to many schools of England, and sanctioned by the local government board, and now the children not only understand the tooth-brush drill, but they start their training for becoming citizens with clean and healthy mouths." This sentence expresses the condition which we should like to have prevail everywhere.

This work has been started with three main objects in view.

First: The relief of the suffering children whose parents are so poor that they cannot pay for treatments. There is a certain percentage of parents who are unable to pay for treatment of their children's teeth, and to have the work done free of charge would lift a great burden from their minds, and would be a benediction to the children during their entire lives.

Second: The instruction of the general public as to how suffering may be prevented by cleanliness, etc. The general public has not been sufficiently instructed in the care of the teeth, and consequently the teeth of the children are neglected during the early years of their lives, which is the period in which the most destruction occurs.

Third: The encouragement of those who are financially able, to take *better* care of their teeth. Many children suffer from exposed nerves and abscesses even in their deciduous teeth, while their mothers cannot understand why they are so cross and irritable. Later in life the thin faces and pale complexions betray the lack of nourishment. The children have been unable to chew their food, and thus prepare it for digestion and assimilation. The germs of various diseases, consumption, diphtheria, etc., linger in such mouths until the weakened constitution offers a rich field for their development, and death claims its victim.

The efficiency of the dental hygiene movement may be effectively increased by bringing seven forces into action:

(1) By enlisting the full support of all the dentists, who must be ready and willing to work. Have you ever seen a little child with tear-stained face holding his hand to the cheek over an aching tooth? Have you ever seen a pretty girl disfigured by missing teeth? Have you ever seen a grandmother whose chin and nose were nearly meeting? Having seen these conditions, are you not moved to lend a helping hand to this cause of extending the field of dental hygiene?

(2) By enlisting the aid of the dental magazines and other periodicals. It is their work to build up, and their influence is assured, as has already been shown, and it is only through them that we can hope to succeed.

(3) By securing the support and goodwill of charitable societies. Data will convince them.

(4) By having the co-operation of boards of education, wherever this work is to be done. Dr. Kirk, in a recent editorial, said: "The proportion of school children in the United States who are

below the average grade and who are repeating courses of study is so great as to involve an addition of $27,000,000 annually to the taxpayers' burden, which it is believed would be materially reduced if the element of mental deficiency due to preventable dental defects was eliminated by effective dental service in connection with our public school system." The board of education can give us an opportunity to examine the teeth of the children, and thereby we may secure data; they can also give financial support and opportunities to educate by lectures.

(5) By securing the instructive influence of the teachers in public and private schools. They should teach oral hygiene in its simple form. Dr. H. L. Ambler said in a paper read before the Fourth International Dental Congress: "A child who is well will learn faster and behave better than one who is ill; thus it naturally follows that the teacher has an easier time."

I recommended in a paper in 1903 that the laws should be so revised that teachers would be required to pass examinations on oral hygiene and oral anatomy in a simple form, as they do on other subjects, in order to receive their license to teach. This would require all colleges that prepare teachers to establish chairs that could be filled by doctors of dental surgery only. The influence created by school teachers would be far-reaching—more far-reaching than anything else of which I could speak—in increasing the dental hygiene movement.

(6) By having the text-books contain more information concerning the teeth and oral hygiene.

(7) By securing the financial support of philanthropic citizens.

May we all work in bringing these seven forces to our assistance, and may we succeed in due time!

The report presented by Dr. Ebersole for the Oral Hygiene Committee is a very creditable one and in general deserves the commendation of the profession. There are a few points, however, in which I do not fully agree with the report, but as most of these are covered in the discussion which I had prepared on Dr. Whecler's paper, I shall refer to but three of them.

(1) I do not understand how we can have an educational movement without philanthropic support. The element of philanthropy enters at least to the extent of the time given by the dentists to the work, if not farther.

(2) The dental profession has been very active and has grown and improved rapidly, but there comes a time in all movements when the growth is most noticeable. There are many lines along which dentistry has had to improve, and it must not be expected that the dental profession can take up all lines which need improvement and develop them perfectly at once. I say this with all due respect to the great work accomplished by the committee.

(3) If we are to have men outside of the profession as members of the councils—and I think that in some the suggestion is a good one—they should be in the local councils and not in the national council.

Dr. W. A. White, Phelps, N. Y. The essayist has presented a most valuable paper on a subject which he contends is not a new one. His statement that oral or dental hygiene was taught before the birth of Christ is worthy of consideration, and if this is true, as with many other things in history, oral hygiene has lain dormant for so long a

period that it had become almost, if not quite obsolete. Its present agitation, then, leads us to believe that it has been born again, and in its new birth has assumed gigantic proportions, so that at the present time no subject connected with our profession is attracting and receiving such general attention.

The essayist justly asks, "How shall its efficiency be increased?" This is a question which to my mind can be answered correctly only in one way, *i.e.* by educating the public, and particularly the mothers and children. This statement is proved by the essayist himself when he refers to hospitals and sanatoriums as "human repair shops," citing the existence of a drinking fountain at the entrance to one of these institutions, where all classes of patients afflicted with various and contagious diseases stopped to drink, all partaking from the same cup—which surely is a generous method of spreading disease—and after the introduction of individual drinking cups a marked improvement among the patients was soon manifested.

If the essayist had brought to our attention nothing more than this one example of what changes for better sanitary conditions can be accomplished by education, it seems to me his object would have been fulfilled. The facts concerning the work which has been done and is being done in Germany and other countries by dental clinics and education on the subject of hygiene are of sufficient importance to cause us, as American citizens and dentists, to ask ourselves what we are doing to aid and assist in the education of the public in this vastly important subject. It is through education alone that the efficiency of this movement can be increased. The statistics which Dr. Wheeler has presented, and which are the result of actual investigation among school children in several foreign cities, I have no doubt would be duplicated if a similar campaign of investigation were carried out here. While much along this line has been done in some sections of our own country, we are sadly deficient in education, opportunity, and equipment to properly carry on the work, and not until the dental profession is given the same opportunity for supervising the conditions which exist today among our school children, demanding instruction in oral or dental hygiene such as is granted the medical profession for controlling conditions far less alarming, shall we be able to aid in increasing the efficiency of this movement. I can instance no better illustration of what can be done than by calling your attention to some of the work which has been done in my own district dental society, to which Dr. Wheeler has referred. While I do not wish to appear boastful, I am of the opinion that more has been done and greater results have been realized in the city of Rochester, N. Y., than in any other city in this country.

Time will not permit me to enter into the work in detail. I will simply refer to the fact that the first free dental clinic in the United States, and for that matter in the world, as far as is known, was established in Rochester twenty-five years ago, but this clinic was maintained for a period of only two years. On February 22, 1905, a free dental clinic was established in that city in connection with the public health association. Since then, two other free clinics have been established, one in No. 14 school and one in No. 26 school, both of which are fully equipped and are doing a great deed of charity by furnishing for the indigent

pupils much-needed as well as greatly appreciated free dental treatment. This has all been accomplished by educating the public, by whom these clinics are maintained. The beneficial results are so apparent that the board of education are in favor of establishing a clinic in each city school. So much for education. In my own home town we are proud of the fact that in our high school we have a regular period on sanitation and oral hygiene. This, I believe, is the logical channel through which the public, as well as the children, can be educated properly and intelligently, and I thoroughly indorse the view advocated by the essayist that the proper method of carrying this campaign to a successful issue is by practical work. The theoretical feature will follow.

I will go a little farther, and advocate the instruction of the public by means of illustrated lectures, literature, and a general campaign of oral hygiene education.

The essayist's paper glistens with instructive and interesting data. It is a beacon of light, which if kept in view in our daily practice, will reflect credit upon our profession and bring a blessing upon our fellow men.

Dr. W. T. Jackson, Cleveland, Ohio. As I sat here listening to the papers and discussions, my thoughts carried me back some twenty years, when my attention was first directed to this matter of oral hygiene. I was satisfied that the common communion cup in use in the churches at that time was a very unsanitary institution, and the idea took possession of me so strongly that I determined to go to my pastor about it and see if we could not establish the individual cup in our church. He also was very much in favor of it, and we brought the matter before the official board, and after quite a good deal of argument, succeeded in getting its authority to make the innovation. At that time there was nothing of the sort obtainable in the stores, so we had difficulty in securing an outfit. I went to a stamping works and had trays made with double bottoms, the upper one containing holes for the individual cup, and I do not know but that to this day they are using that same outfit in that church in Cleveland. So far as I know, there is not one Protestant church in that city that is not using the individual communion cup, and I am of the opinion that they are using them in all the cities of this country, with scarcely an exception. I only speak of this to show what a little effort will accomplish.

This oral hygiene work appeals to me so greatly that I am ready to give my whole heart and soul to it. I have been working along this line for several years in our state society, and I shall continue to work as long as I can obtain results. I believe the spirit of this movement is in the air, as Dr. Evans remarked to me last night, and everybody who reads and thinks at all is thinking about it.

The section then adjourned until Thursday evening.

THURSDAY—Third Session.

Section III was called to order at 8.30 P.M., Dr. William Carr, New York, occupying the chair.

Dr. G. V. I. Brown of Milwaukee, Wis., read a paper entitled "Diseases Affecting the Buccal Mucous Membrane."

Diseases Affecting the Buccal Mucous Membrane.

By GEORGE V. I. BROWN.

It is not my purpose to attempt to bring forward any of the following diseases as being new. All are well known, and each has been frequently and fully described by dermatologists and syphilographers, who by reason of their special divisions of medical practice are much better qualified to do so than anyone could possibly be whose sphere of observation is not so concentrated. But when one contemplates the meager lists of diseases of the mucous membrane of the mouth that are to be found in dental and oral surgical literature at the present time, it becomes distinctly apparent that there is need of a more complete and comprehensive tabulation and classification of these diseases.

It may appear that some of the pathologic conditions herein enumerated are so rare as to make description of them almost superfluous; in advance of such criticism it seems well to call attention to the fact that one of the chief reasons why they have not been more frequently reported is that they have doubtless not been recognized in as many instances as they should have been. Dentists on the one hand and physicians on the other have each failed to make accurate diagnoses, and it is my knowledge of the frequency with which, through want of intelligent and early consultation, these errors occur, and of their disastrous effects as they have come under observation in my own practice, that has prompted the selection of this subject and the manner of its presentation.

CLASSIFICATION OF DISEASES OF BUCCAL MUCOUS MEMBRANE.

Detailed description of each form of disease is beyond the limits of a single paper, and I have therefore confined myself to such features as might be required to justify inclusion in this classification: Dento-alveolar abscess. Pericemental abscess. Marginal gingivitis. Interstitial gingivitis. Simple stomatitis. Catarrhal stomatitis. Bednar's aphthæ. Ulcerative stomatitis. Gangrenous stomatitis. Parasitic stomatitis (Thrush). Leukoplakia buccalis. Lichen planus. Foot-and-mouth disease. Actinomycosis. Glanders. Ludwig's angina. Pseudo-membranous stomatitis. Phlegmonous stomatitis. Tuberculous stomatitis. Syphilis. Gonorrheal ulcero-membranous stomatitis. Acute leukemia. Pernicious ane-

mia. Blastomycosis. Mycosis fungoides. Leprosy. Herpes simplex. Purpura hemorrhagica. Pellagra. Scorbutus. Pemphigus. Pigmentation. Trauma. Burns. Erythema. Urticaria. Eczema. Erysipelas. Kerostomia. Tumors.

TUMORS.

The tumors of the mouth which cause, in varying degree, alteration in the form and character of its mucous membrane more particularly are—Angiomata. Cysts. Papillomata. Polypi. Myxomata. Carcinomata. Sarcomata.

DISEASES HAVING SIMILAR SYMPTOMS.

Of the foregoing diseases there are several which sometimes require careful distinction in order that they may be properly differentiated, viz: Interstitial gingivitis. Ulcerative stomatitis. Aphthous stomatitis. Gangrenous stomatitis. Acute leukemia. Pernicious anemia. Tuberculosis. Syphilis. Leukoplakia. Carcinoma. Scorbutus. Purpura hemorrhagica.

Interstitial gingivitis which does not yield to the usual manner of treatment with reasonable promptness, has, it is fair to assume, some underlying etiologic factor which requires correction.

Aphthous stomatitis may be excluded from *gangrenous stomatitis* by the features as compared on the following page.

Blood examination in *acute leukemia* shows marked increase of white corpuscles, this excessive leucocytosis being accompanied by reduction in the number of the red corpuscles. In *pernicious anemia* the nucleated red corpuscles are pathognomonic of the disease.

These with other more general symptoms make a distinction quite readily established.

Scorbutus has been compared with *purpura hemorrhagica* by Schamberg as exhibited on the following page.

Syphilis. Since the old idea of stereotyped forms of this affection has been lost in the light of the present knowledge of this disease, that presents itself in such different guises, syphilis is always a possibility to be considered in the diagnosis of any of these and of many other pathologic conditions.

Individual, family, and clinical histories with demonstration of the spirochæta pallida, and in suspicious cases—even in the absence of complete diagnostic demonstration—the administration of potassium iodid, alone or in connection with mercury bichlorid, must be depended upon to safeguard treatment.

NEOPLASMATA.

Neoplasmata can only be diagnosed with certainty by using the microscope. The only hope of giving permanent surgical benefit in the treatment of malignant growths affecting the mouth and jaws lies in early diagnosis by which complete removal may be accomplished. Therefore it should become a rule, to be religiously observed by all who undertake the care of lesions in this region, that immediate attention be given to every growth that may by any possibility be suspicious; or, when its true etiologic character is fully understood and accounted for, removal of a portion of the tissue, its preservation in two per cent. formalin solution, and the preparation of a slide for the microscope will enable the operator to promptly and accurately determine its true character. I could quote a long list of patients from my own practice and give full microscopic demonstration, if necessary, to prove that the lives

Differential Diagnosis.

(1)

APHTHOUS STOMATITIS.	GANGRENOUS STOMATITIS.
1. Situated on cheeks and lips.	1. Occurs at or near the gingival margins with tendency to spread over other surface.
2. Round or oval with fairly distinct outline.	2. Is more or less irregular in form.
3. Sensitive to sweet and sour agents and to touch.	3. Not markedly sensitive to irritation.
4. Does not show tendency to affect underlying bone structure.	4. Does affect bone structure.

(2)

SCORBUTUS.	PURPURA HEMORRHAGICA.
1. Occurs in those subject to lack of vegetable food and to bad hygiene.	1. No such etiologic relationship.
2. Definite antecedent symptoms—weakness, impaired circulation, etc.	2. Antecedent signs slight or absent.
3. Onset slow.	3. Onset sudden.
4. Gums spongy, swollen, and bleeding; teeth loose.	4. Gums often bleeding, but not swollen.
5. Severe muscular pain.	5. Less marked.
6. Brawny infiltration of lower extremities.	6. Not present.
7. Hemorrhages from mucous membranes, not profuse, as a rule.	7. Hemorrhages from mucous membrane so severe as to prove fatal.

(3)

LEUCOPLAKIA.	LICHEN PLANUS.
1. Subjective symptoms of dryness, stiffness, more or less pain from hot or very cold liquids or spicy substances.	1. The lesions of the cheeks are rarely noticed by the patient, and then only when the tongue perceives slight roughness. Slight stiffness of the tongue; no pain.
2. Never heals without local interference.	2. May heal spontaneously or disappear by the administration of arsenic. Local treatment seldom required.
3. Papular formations are rarely present. The plaques, if present, are as a rule thickened and hardened.	3. Papulous plaques are uniformly present.
4. If left untreated, show tendency to increase in thickness, become rough, rugged, and exfoliating.	4. Become flatter and smoother until level with the mucosa.
5. The papillæ of the tongue may be accentuated.	5. Papillæ of the tongue are flattened.
6. Is infrequent in women.	6. Is equally frequent in both sexes.

(4)

SYPHILIS.	LICHEN PLANUS.
1. Syphilitic lesions of the mouth are painful (except plaques of the tonsils, which may be painless).	1. The eruptions are painless.
2. The mucous plaques are situated within a highly reddened infiltrated area.	2. Surrounded by perfectly normal mucosa.
3. The manifestations show tendency to progressive changes as erosion, ulceration, and proliferation.	3. Though quite persistent, it shows no such changes.
4. Typical cutaneous lesions.	4. Typical cutaneous lesions.

of these patients might have been saved, had the above measures been taken by those who had opportunity to see them in the early stages; and all whose practice gives them opportunity to see cases of this character could undoubtedly do the same. This division of the army of the dead, representing those who might have lived much longer and might have been saved untold suffering, is undoubtedly an unnecessarily large one, and it behooves us to guard the recruiting stations.

CONCLUSION.

To sum up, I desire to state that it is my hope to have the consideration and discussion of this paper lead to a more comprehensive and accurately scientific classification of diseases of the mouth in general, as well as those affecting the mucous membrane; to bring about better and more accurate rules for differential diagnosis in the treatment of these affections, and above all, to lead onward at least one step toward more frequent consultation with practitioners in other divisions of medical science, and to enhance the usefulness of these consultations by helping even though indirectly toward a more discriminate use of the language of modern pathology and medicine—to the end that there may be a more complete understanding brought about and in the end a vastly greater accomplishment effected in the direction of the relief of human suffering.

[The paper was illustrated by a number of colored slides.]

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SCHAMBERG. "Diseases of the Mucous Membrane and Eruptive Fevers," p. 205.

——— *Journ. Amer. Med. Association*, Feb. 16, 1907, pp. 559, 560.

Discussion.

Dr. J. D. PATTERSON, Kansas City, Mo. I have been much interested in this subject. Very many of the lesions which were depicted upon the plates and which have been spoken about are rare as far as general dental practice is concerned, and are chiefly to be met with in hospital practice.

Had Dr. Brown done nothing more, he would by his presentation of this subject have rendered a very valuable service in showing us the importance of early observing the beginning of these troubles, and detecting any indication of stomatitis or any of the grosser troubles, and in emphasizing that the dentist in general practice should religiously note and care for these cases, especially if the patients are in a poorly nourished condition. The rapidity with which these diseases progress is alarming at times, eventually resulting in death if the slight early symptoms have not been observed.

Dr. Brown's paper will prove of great value to us all in enabling us to diagnose these conditions. I have had cases similar to some of those enumerated sent to me by physicians, and generally these cases had progressed very far, while very slight care and the removal of local irritation would have prevented the loss of teeth and even of whole sections of the jaw. If the dentist is unable from experience and observation to make a diagnosis when some of these serious cases present, a blood count should be taken, or a microscopic examination be made by a specialist. Every neoplasm, every abnormal growth in the nature of a tumor or hypertrophy which we find in the mouth should be investigated to ascertain its character, and if indicated its removal effected at once.

We know very little about the nature and the cause of tumors and cancers, either of carcinomatous or sarcomatous type, but we do know that they must be treated at their inception, diagnosed, and immediately removed. Their character will determine how deep the cutting—how thorough the removal should be. Sometimes it is not necessary to cut far. The examination which the microscopist makes will determine this.

I am very much pleased that our attention has again been drawn to the necessity for careful diagnosis, because in debilitated conditions of the system due to faulty nutrition many of these troubles ensue. Children, especially, suffer from these disturbances. Nearly all of these troubles, gingivitis, the nomas, catarrhal stomatitis, etc., are chiefly to be found in poorly nourished young people, and in grown-up persons who have indulged in the excessive use of alcoholic stimulants and tobacco. One of the very worst oral conditions I have ever observed was the result of the excessive use of very strong tobacco and cigars.

A case which had been diagnosed by a physician as Ludwig's angina was recently sent to me, but proved to be nothing more than typical pyorrhea occasioned by large deposits of serumal and salivary calculus upon the lingual surfaces of the posterior molars on both sides of the mouth, the swelling having extended until the submaxillary glands were badly swollen. A thorough antiseptic treatment, and a thorough removal of the calculus and smoothing of the surfaces which originally caused the trouble resulted in relieving the difficulty. The swelling had extended even into the fauces; the tonsils were badly swollen—all this trouble having been occasioned by the accumulation of tartar upon the teeth. After it was removed, the trouble disappeared within six days. If it had gone on a short time longer, as you very well know, the whole process and perhaps the jaw might have been sacrificed.

Ludwig's angina is, in common parlance, merely sore throat. Very often the inflammation extends into the mouth, involves the glands, and becomes very troublesome. While this is a disease especially within the domain of the medical practitioner and which the dentist is not called upon to treat, still, when it extends into the oral cavity it becomes the dentist's duty to remove all possible local irritation and establish a sanitary condition.

This disease was supposed to have its origin in a bacillus which was always found present in such cases. In the modern text-books on pathology there is no mention of Ludwig's angina, nor do we find mention of others of the diseases referred to by Dr. Brown, which I think is a mistake. There should be a more complete classification, such as Dr. Brown has given us in his paper. I do not believe that Ludwig's angina ever makes its appearance in the oral cavity unless a local irritation is present there. If it extends into the mouth, some reason will be found for that local irritation. I am very sure that the irritation very often commences about the third molars, owing to some cause, whether this be a cavity with ragged edges, or impeded eruption of a third molar, or calcic deposits, any of which might be sufficient to cause irritation extending into the throat. If such a case is taken in hand early, before it becomes deep-seated, it can be treated very successfully and cured rapidly. If one of these diseases is presented to the dentist and he is unable to diagnose it, and in a short time effect a

cure, he should not hesitate a minute in investigating the real nature of the disease, specific or not, and selecting the proper remedy—because often it may assume very serious proportions, while the original irritation may have been very slight indeed.

Dr. Horace Warren, Missouri Valley, Iowa. I will touch only upon some of the phases of stomatitis that we as practitioners of dentistry come in contact with, and are able to either prevent or cope with.

Dr. Brown has told us that from the time a baby is born it is liable to be infected with micrococci, staphylococci, pneumococci, or many other parasites, and it is our duty in this age of prophylaxis to do what we can to prevent the ravages of these enemies of health.

Cancrum oris is a disease of squalor, a malignant one, and we should recognize it the same as syphilis in the mouth. It is not right that a dentist perform oral operations, and, owing to his ignorance and neglect, let these diseases pass by unnoticed and the victim go to the grave; it is his duty to explore the oral cavity and endeavor to maintain it in a sanitary condition.

I have a magnificent masticating apparatus produced by brushing my teeth before breakfast for over forty years, which has induced in me correct metabolism, and it is faulty metabolism which produces a great deal of stomatitis. Dr. Brown agrees with me.

In this peculiar age of American enterprise, a man will go to the breakfast table, put his newspaper up in front of him, and attempt to read while he is eating. Can such a habit produce a sufficient flow of saliva? Can one read the sickening details of some horrible murder while he is trying to eat, and produce that salivary fluid so necessary to digestion? Or perhaps, while endeavoring to masticate his bite of beefsteak, a man may be reading of the terrible disgrace that has been brought to his town by the defeat of his ball team. Will that induce correct assimilation and digestion? I think that we should live to eat, and not eat to live, for only in that way is a correct flow of saliva established. In this paradoxical age we find the airless balloon, the dustless duster, and other peculiarities; we also find predigested food on the market, the bane of the human system, often producing in the alimentary canal stomatitis to begin with, and finally fistula of the colon, establishing on the way down such relay stations, perhaps, as ulcers of the pyloric orifice, cancer, and appendicitis. What we need is food that requires crushing, that must be eaten with great vigor, and if we do not have such food and properly masticate it, we shall suffer from stomatitis, not perhaps in the forms that I have enumerated, but in all the other forms—which we can prevent. Often patients present teeth so filthy and so thickly covered with strings of partly masticated food that one is loath to touch them; and yet they say, "Doctor, I have ruined my teeth by cracking nuts." That is what they should have done. I have done it all my life, and I have twenty-eight sound teeth.

Such patients are not using their teeth vigorously enough; they mollycoddle over their food, and wash it down with gulps of coffee and other drinks instead of making the salivary glands do their duty.

Can you imagine a more anomalous circumstance than stomatitis in the mouth of Theodore Roosevelt? If Horace Fletcher is ever troubled with aphthous ulcers, I'll surrender my theory.

The phase of stomatitis which is ma-

lignant, and which has been treated so exhaustively by the essayist, sometimes comes under our observation, and we should recognize it. You remember the case of General Grant, who died from the effects of epithelioma. Over twenty years ago, Dr. Abbott, who was called in consultation to see General Grant when he lay upon his death-bed, told me that he found that the general's molars had sharp, broken-down edges, evidently a condition which had been in existence for some time, and this in a man who had been president of the United States for eight years and general of the United States army. These sharp edges of the teeth had been eating into his tongue, because he did not have courage enough to have them extracted, and never kept his mouth in anything like a hygienic condition. Giant cells were formed, and cancer killed him. The opinion has prevailed generally that it was General Grant's tobacco which proved his undoing. People neglect their teeth and allow decaying matter to accumulate about the interstitial spaces and the gingival margins, which, in my opinion, is ten times worse than tobacco, although I do not use the latter myself.

We should not be content, in this age of prophylaxis, simply to give our patients directions as to the proper personal care of the teeth. That is not enough. We should conscientiously examine the mouth and tell the patient everything that seems to be needed. We should become acquainted with the various forms of disease, even if we do not intend to treat them, as the essayist has pointed out. We should see that our duty is done conscientiously. In the practice of our profession let us keep in mind these beautiful words of that grand old statesman, Daniel Webster: "There is no evil that we cannot either face or fly from except the consciousness of duty disregarded."

Dr. Henry C. Ferris, New York, N. Y. After the last speaker's statement regarding those of us who have control of their own diet, I am constrained to speak of my experience in a hospital this spring. I was called in consultation to an institution which took care of children from birth to four years of age. There were four children whose deciduous teeth were loose, the gums bleeding and discharging pus. The hospital surgeons did not know what to do with these cases, and as a last resort they called in a dentist. The condition was edematous in each one; the eyes were almost closed, the lips very much swollen, and there was considerable discharge of blood. I used bismuth paste and honey, coating the gums and tooth surfaces therewith, and the edematous condition went down. But the cases were so far advanced that the treatment had little effect, and the children died one after the other. We kept one child alive for about ten days, but in the progress of the disease the upper lip sloughed away around the nose, and there was a general necrotic condition of all the alveoli.

About a month after, the same condition was observed again, but in this case they called me in at the initial stage. In this case the teeth commenced to loosen, and there was a discharge of pus, but with very little blood. In this second instance, I used a dilution of lime-water adding one ounce to each bottle of milk. The mouth was sprayed six times a day with lime-water and hydrogen dioxid. The solid food that the children had been eating was changed; the soft bread was dried in the oven to a hard rock, and each child was compelled to masticate

this. Under this lime-water and hard bread treatment the lesions were cleared up, and each child afflicted made a perfect recovery. The subsequent change in diet in that hospital was thorough and immediate; now no soft bread is used there. This illustration applies so directly to the thought brought out by the last speaker that I believe it to be worthy of comment.

Dr. TRUMAN W. BROPHY, Chicago, Ill. I believe that a very large majority of the members of our profession do not regard seriously the effects of persistent irritation, and the people at large seem to absolutely disregard local irritation. In my own practice I have treated many cases of malignant growths which originated from irritation set up by sharp and broken or carious teeth, the edges of which lacerated the cheeks or the tongue, and in many instances I have observed growths established by reason of inflammation due to poorly fitting artificial dentures. We all have seen patients with temporary dentures which they have continued to wear for a period of years, although they did not fit properly. These plates, being loose and moving about, lacerated the membranes, and continued to irritate the parts, until by and by this continuous irritation resulted in cell generation and growths of a malignant type. If there is any lesson to be learned which should be impressed upon every member of our profession in this discussion, it is this: Wherever any condition exists of either broken teeth, carious teeth, poorly fitting dentures, badly fitting crowns or clasps, or anything that will establish and maintain a state of irritation, such as calcic deposits or any of the innumerable sources of irritation, it should be promptly cared for. How well this truth is exemplified in the remarks made by one of the speakers regarding the last illness of General Grant. The crown prince of Germany, who for thirty days was emperor, had exactly the same condition; and even today the discussion has not terminated as to whether Emperor Frederick died of carcinoma or something else, and probably it will never be settled. Time does not seem to make any difference, and this case is still a topic of discussion in Germany as well as in our own country. We may sometimes almost justly wonder whether there be any scientific verity—when scientific men fail to agree when examining the same microscopic presentations with a view of determining whether some tissue under the microscope is from a malignant or a benign growth.

The presentation of papers like the essayist's before a National Dental Association is really a matter of very great importance, and if Dr. Brown has succeeded tonight in impressing this great audience with the importance of looking with extreme care to the conditions of the oral cavity, where pathogenic bacteria always abound—the greatest of all centers of infection being the oral cavity, an area in which irritation is more apt to occur than in any other part of the body—if he has succeeded in impressing upon this audience the importance of hygienic measures and of prevention of irritation, he will have done good work toward the preservation of human life.

Dr. BROWN (closing the discussion). In apology to those who kindly consented to take part in this discussion, I desire to add a public explanation to the personal one already given. At a critical period in the preparation of this paper, before I had the diseases arranged in what seemed to be reasonably good order, I was taken quite ill, and when I was

able to get about again the time was very short. I tried to mail copies to these gentlemen, knowing that they might wish time for preparation, but was unable to do so.

I desire to state that I appreciate very highly the courtesy of the speakers and the useful suggestions they have made. My own feeling about the subject as a whole is this:

We are talking a great deal just now about oral hygiene, urging upon the medical world and the laity the necessity for prophylaxis in a very aggressive manner. Great work is being accomplished, and much greater will be accomplished. But the sooner we classify the diseases in the field of special pathology reserved for us, and indicate definitely that we understand exactly why there is danger in neglect, and what the danger is, the sooner we shall have the respect of the medical world and the confidence of the laity, and the more quickly we shall accomplish the beneficial results which you and I and all members of our profession so earnestly desire.

Dr. Richard Summa. Before dismissing the audience this evening, I wish to extend my personal thanks to Dr. Brown for his paper, which has so interested and delighted us tonight. He has been very much overburdened with work this past winter, and it took some persuasion to induce him to come and present this valuable addition to our scientific literature. In view of all this, I move you that we extend a vote of thanks to Dr. Brown for his splendid effort of this evening.

The motion was seconded and carried.

Section III then adjourned until the next annual meeting.

THE CLINICS.

Chairman—F. O. Hetrick, Ottawa, Kansas.
Secretary—A. Crumley, Birmingham, Ala.

The clinics were held in the auditorium on Wednesday and Thursday, under the direction of the Clinic Committee, with Dr. F. O. Hetrick, chairman, Dr. A. Crumley, secretary, and Dr. A. W. Starbuck of Denver, Colo., in charge.

Each clinician was requested to furnish a typewritten report of his clinic to the secretary of the Clinic Committee for publication in the Transactions, but though urged in person by the secretary during the meeting and by repeated letters after the meeting, many of these reports have not been forwarded. Those which have been reported follow, under subject headings indicating the special departments of dental art and science to which they belong.

ORAL SURGERY: CLEFT PALATE AND HARE-LIP—FRACTURES—EXTRACTIONS—IMPLANTATIONS.

Dr. Truman W. Brophy, Chicago, Ill., "Operations for Cleft Palate and Hare-lip."

Case 1. This was a girl of three and one-half years, presenting a condition of congenital hare-lip and cleft palate. The lip had been operated on at the age of eight or nine months. The palate was cleft throughout its entire extent, from the alveolar process to the tip of the azygos uvulæ.

The operation consisted in lifting up the muco-periosteum from each side of the cleft and bringing the tissues together in the median line, fixing them by means of silver sutures and lead plates, holding the edges of the cleft in proximity by the use of horsehair sutures.

This patient should have been operated on for the soft palate when about fourteen or sixteen months of age. It is unfortunate that the early teachings and practices have led many physicians to advise waiting until the child has attained the age of from three to five years before the operation is attempted. Had this child been operated on at the age above mentioned, she would have acquired perfect articulation as she learned to talk. The older the patient, the more difficult it is to overcome the bad habits in speaking.

The results to be expected in this operation are, first, a union of the palate throughout its entire length.

By the manipulation practiced in this

case we have lengthened the palate by dropping it backward and downward. This has been done by dividing the mucoperiosteum on the nasal surface at the distal border of the horizontal plate of the palate bone. As soon as this tissue is divided, it permits the soft palate to drop downward and backward and to reach over to meet the tissues of the opposite side, which have been similarly treated. It will be observed that we have not made lateral incisions, thereby dividing the tensor palati muscle, according to the early teachings of Sir William Ferguson, and since practiced by many operators.

The division of the tissues laterally or the making of lateral incisions I regard as wholly unnecessary. Such incisions excite a hemorrhage, which should be avoided; they open up an area for infection, and deprive the palate of one of its important functions. It will be remembered that the tensor palati muscle arises from the scaphoid fossa of the sphenoid bone. It extends down around the hamular process, to be distributed to the soft palate and the pharyngeal orifice of the Eustachian tube. It therefore makes tension on the palate and dilates the orifice of the Eustachian tube. Once completely divided at the hamular process, its fibers will retract so far that a complete union of the divided muscle is quite impossible. It will therefore be readily seen that the palate, by reason of this division, will thereafter fail to become tense, and the pharyngeal orifice of the Eustachian tube will no longer normally dilate. There will be a defective palate and there will also be defective hearing.

Nor is this all. Palate incisions of considerable length will be followed by a disturbed nerve function, and consequent atrophy of the soft palate. Dr. Alexander Hugh Ferguson of Chicago, in a recent conversation, informed me that he had noted in his practice a case of muscular atrophy of the palate resulting from lack of nerve function due to the division of these nerves in making lateral incisions in performing an operation on the palate. Furthermore, the mass of cicatricial tissue left in the palate will make it thick, clumsy, non-flexible, and a failure so far as perfect phonation is concerned. Besides, in the case we have just operated on, we find there is no necessity for division of the parts, since the tissues lie in perfect contact and are united.

The lead plates and silver tension sutures serve a double purpose: First, the plate prevents the cutting out of the sutures, since it lies upon the surface of the palate and makes tension on the soft parts throughout its entire length, and we are not dependent upon the pressure of the sutures alone. Second, it acts as a splint to hold the entire mass in a state of quiet, until the hemispheres of the palate have perfectly united.

The coaptation sutures of horsehair serve every purpose for which such sutures are employed.

We have, then, in the mouth lead plates, tension sutures of silver, and coaptation sutures of horsehair; nothing has been employed that can absorb secretions. We have placed these tissues in the most satisfactory condition to unite, and have reduced the possibility of infection to the minimum.

We may reasonably expect a good result, and that the child will be able to speak plainly after receiving some lessons in the pronunciation of certain words.

Case II was that of a man forty-two years of age, having a complete cleft of the hard and soft palates. The lip had been operated on in childhood. This man was eager to have his deformity cured.

The same technique was employed as in case I. The parts were brought into contact and sutured.

We may reasonably expect that the tissues will unite in this case, and the patient will greatly improve in speech. The perfection of his speech will largely depend on careful training. It is well known that a patient who has been speaking for forty years with certain intonations will not overcome his defects in a little time. He will, even with a perfect palate restored, still continue to speak badly unless he is trained and taught how to overcome his old defective habits of articulation.

Case III was an operation on a child of five years, the technique employed being the same as in above cases.*

Dr. S. D. Ruggles, Portsmouth, Ohio. "Simple Method of Reducing Fractures of the Mandible."

In the method shown the clinician makes no claim for originality, but would simply give a demonstration of what is perhaps the most universal of applications for fractures of the mandible when there are teeth remaining. Demosthenes mentions the wiring of teeth several centuries before the Christian era, and many authors have referred to it in succeeding centuries. Dr. Gilmer of Chicago reported the use of this method in the early eighties, only the materials employed were different. The three cases demonstrated have been treated in my own practice, and show the conditions most generally met with in accidents of this class. In other words, these cases represent a type, and the wiring of each case will depend upon the teeth remaining for attachment.

Case I. (Figs. 1 to 5.) This was a compound comminuted fracture between the right canine and lateral incisor, with the destruction of several teeth in both upper and lower jaws. The occlusion was restored perfectly, and the features show no ill effect from the injury.

Case II illustrates a similar condition, with an additional fracture between the second and third molars. Figs. 6 to 10 represent the completed case, while Figs. 11 to 16 give an idea of the appearance of the patient with the appliance *in situ*. The dark spots under the fingers in Fig. 16 represent the beeswax covering the ends of the wires, this wax protecting the lips and cheeks from irritation. Fig. 17 shows the line of fracture and the amount of tissue destroyed by necrosis.

Case III (Figs. 18, 19, and 20) is almost identical with case I; in fact, both were the result of injuries inflicted by animals, while the other was due to a railroad accident. No bandages were used in these cases. While various materials have been used for this work, the best results have been obtained by me with a No. 19 Brown & Sharpe gage rolled gold wire such as is used by jewelers. It is easily bent to conform to the teeth, and has sufficient strength to withstand any strain from muscular contraction, even severe vomiting. It will be noticed that but one wire is used for one tooth. No effort is made to replace the fragments until all of the teeth decided upon for retention have been

*[These patients all made good recoveries, as I have been informed since leaving Denver.—T. W. B.]

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(*Case I.*)

Fig. 1.

Fig. 2.

Fig. 3.

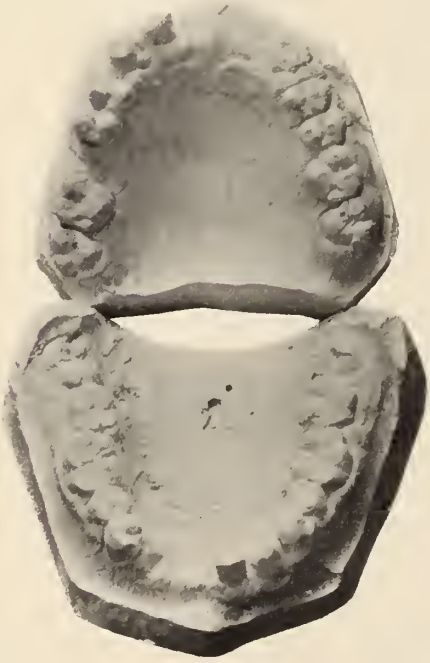


Fig. 4.

Fig. 5.

(*Case II.*)

Fig. 6.

Fig. 7.

Fig. 8.

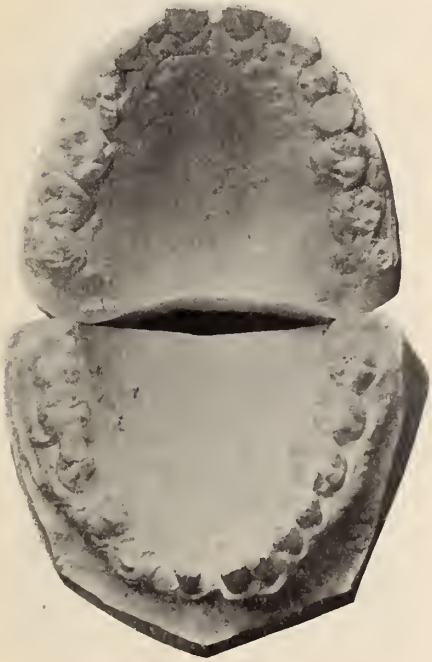


Fig. 9.

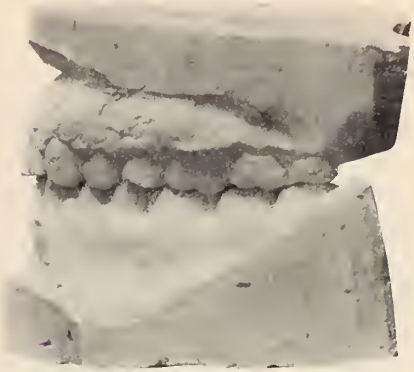


Fig. 10.

Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

Fig. 16.

Fig. 17.

(*Case III.*) Fig. 18.

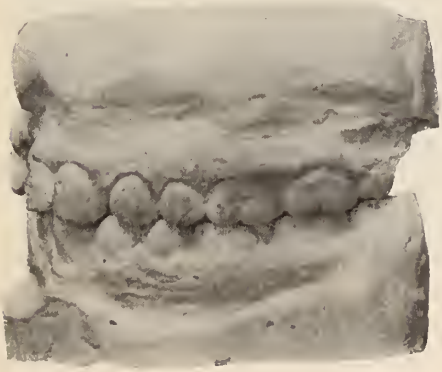


Fig. 19.

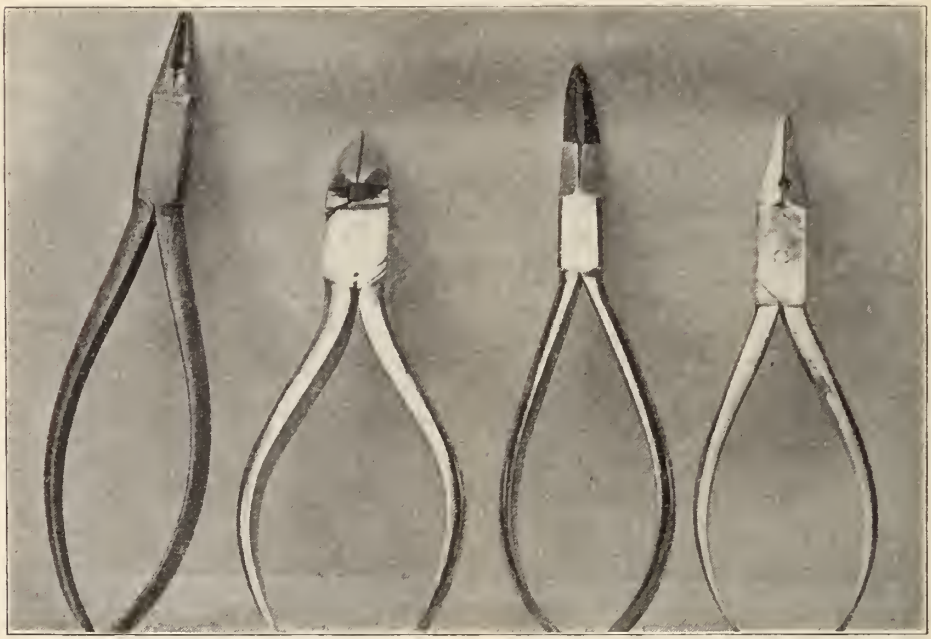
encircled about the neck, and the attachment has been made perfectly secure.

Fig. 20.

Fig. 21.

Then the distal wire of the lower jaw is twisted with the mesial wire of the upper. This twist is made on a line with the occlusal surfaces of the teeth, thus avoiding any additional irritation to the gums, and at the same time permitting of easy cleaning. The other two wires are secured in like manner, and if care is observed, the occlusal planes of the teeth will be brought into their

Fig. 22.



normal positions. Care must be exercised to set the piece first which will not interfere with the accurate placement of other fragments; then the apposition is secured as indicated by the line of fracture, and the wires are fixed as in the beginning.

Absolute rigidity can be maintained during the entire period necessary for union. As a rule, some little slack is noticed after the first twenty-four hours, owing to the slipping of the wires to new positions or to elongation, but this is easily remedied by a turn or two of each wire near the occlusal surfaces. By turning a ring on the ends of these wires the chances of irritation are reduced to a minimum, although I think it best to cover them with a piece of wax or modeling compound. Fig. 21 gives a good idea of the method described, and Fig. 22 shows the pliers used for this work.

Dr. J. Bruce Pherrin, Des Moines, Iowa. "Extraction of Impacted Third Molars."

Case I. Lower left third molar, not fully erupted. With a Peeso canal reamer the process was cut away distally to the molar. A straight spike elevator was employed, tipping the tooth to distal, and removing it with thumb and finger.

Case II. An upper left third molar was extracted with a Physic forceps. The masticating surface of the molar presented to buccal. The use of the Physic forceps in such cases was demonstrated.

Case III. Lower left third molar, deeply impacted, with large abscess to lingual, pus discharging about the tooth. The tissues were badly inflamed and swollen, the left tonsil affected. The tooth was erupting on correct lines, the masticating surface of the third molar lying at the level of the gingival border of the second molar. With a Peeso canal reamer the process was removed distally to the molar, the cutting being extended to the apex of the third molar, and with straight spike forceps the tooth was tipped distally.

Dr. E. J. Greenfield, Wichita, Kans. "Implantation of an Artificial Root."

This clinic consisted in exhibiting an artificial root, made of reinforced wire loops, made of gold wire and soldered to a disk base having a slot for carrying an artificial tooth or an abutment for a bridge.

The patient presented, Dr. R. B. Hammond of Winfield, Kans., has worn this appliance long enough to demonstrate its feasibility. The operation consisted in the implantation of an artificial root for the upper left bicuspid.

This root is constructed of iridio-platinum wire, No. 20 gage, soldered with 24-karat gold. The base, with a groove for the crown attachment, is cast of 22-karat gold, and is soldered to the iridio-platinum frame. This frame is placed into the socket that has been prepared, and is left there for three months before the crown is set. At the end of this time the new growth of bone has filled the socket and holds the root perfectly solid.

Dr. Mallory Catlett, Denver, Colo., and Dr. Raymond R. Smith, Denver, Colo. "Difficult Extractions Under Somnoform Anesthesia."

Dr. Catlett administered the anesthetic, somnoform, after which Dr. Smith performed the extraction. Two patients were anesthetized and operated on successfully. The first case was that of a

man about sixty years of age. Six teeth were removed with one administration of somnoform, three of these extractions being difficult. In the second case, Dr. Catlett administered the anesthetic, and Dr. Smith removed two badly broken-down roots of the upper right first and second bicuspids. Both patients recovered promptly from the anesthetic.

ANESTHESIA.

Dr. A. E. Mann, Findlay, Ohio. "A Method and the Advantages of Preparing One's Own Nitrous Oxid."

The comparative safety of nitrous oxid as an anesthetic and its physiological effects are too well known to need mention in this clinical report.

What it is desired to establish by this clinic is the fact, proved by ample clinical experience, that if the drug is prepared fresh and given at body or at least at room temperature, its anesthetic effect is much safer and pleasanter than if it be administered from a cylinder.

The majority of specialists prefer to make their own gas, not only because it is more economical to do so, but because they have noted the fact that they obtain much better results than with cylinder gas.

One of the first requirements in administering any anesthetic, and especially nitrous oxid, is to allay the fear of the patient during the first stages of narcosis. If cylinder gas be given, the freezing temperature of the drug startles the patient, and often irritates the respiratory tract, producing a difficult inbreathing and consequent turgescence of the face, indicating an approach to asphyxiation. This condition is not noted if the drug is administered fresh and at a respirable temperature.

Passing from the cylinder to the gasometer or rubber bag and thence to the patient through a rubber tube and facepiece, the gas has no chance to warm up to any perceptible extent.

The fact has also been proved by clinical experience that cylinder gas produces more nausea and distress, which makes one fear that it may deteriorate in the cylinder. The average practitioner does not care to have in his office the large and cumbersome apparatus of the specialist, or, if he did, would not have call enough during a day for the gas to pay him to make it in large quantities. Hence I have devised a small outfit for making one dose at a time, if need be, while the patient waits in the office. This consists of a Florentine flask of one-liter capacity for the retort, and three wash-bottles for purifying the gas. These bottles are called Woulfe bottles, and hold about three pints. The wash-bottles are of the same shape as the large ones of the S. S. White Dental Manufacturing Co., and together with the flask, can be secured from any wholesale chemical company, as can also the small rubber corks necessary and the glass tubing, which can easily be bent to the desired shape over a Bunsen burner. The thin glass flask must be heated over a sand-bath.

About six ounces of granulated ammonium nitrate is placed in the Florentine flask, and this is set on the sand-bath over the gas burner. From this retort a glass tube of about one-fourth of an inch in diameter passes through the rubber cork to the wash-bottle No. 1, which contains one inch of plain water and serves as a drip bottle. From the second opening of this bottle a glass tube is bent to pass into the first opening of bottle No. 2, which contains nearly one quart of water in which one stick of caustic pot-

ash is dissolved. This tube passes down near the bottom of the flask.

Out of the second opening passes another glass tube to bottle No. 3. This tube, as it passes out of bottle No. 3, does not touch the caustic solution, but simply goes through the cork and down to the bottom of the first opening of bottle No. 3, containing a like quantity of iron sulfid. The ammonium nitrate breaks up into gas and water:

$$NH_4NO_3 = N_2O + 2H_2O.$$

The H_2O is collected in the drip-bottle. The caustic potash solution removes any possible free ammonia or chlorin, which is sometimes formed if the salt is not pure. Care must be used not to overheat or cause too rapid an evolution of the gas, else red fumes of nitric oxid will be formed. While the ferrous sulfate will take this out, it is best never to heat the generating flask to the point of producing the higher oxid of nitrogen indicated by the red fumes.

From bottle No. 3 the gas is conveyed by rubber tubing to a gasometer of any design, from which it is administered to the patient.

Those practitioners who have discontinued the use of nitrous oxid in their practices owing to the unsatisfactory results obtained with cylinder gas, will find it one of their best servants if they will prepare it themselves.

Dr. W. H. DeFord, Des Moines, Iowa. "The Stark Inhaler."

Dr. DeFord demonstrated various uses of the Stark Anesthetic Inhaler for the administration of somnoform, ethyl bromid, ether, and chloroform, singly, in combination, or in sequence.

Dr. Frank L. Platt, San Francisco, Cal. "Demonstration of Local Anesthetics for Painless Removal of Pulps, Preparation of Cavities, and Extraction of Teeth."

The anesthetic used was Peritundo, which consists of a pellet containing 3/8 of a grain of novocain and 1/1500 of a grain of suprarenin. The fluid used is a solution containing about one per cent. ammonio-pheno-iodate. One tablet is to be dissolved in twenty drops of this fluid. This is injected hypodermically through the gum flap between the teeth, or through the gum between the roots of molars. The needle should penetrate the gum and the edge of the alveolar process and reach the pericementum above the gingival attachment of the gum and pericementum. If injected slowly, this drug will anesthetize the tooth so that a pulp may be removed, cavities prepared, or a tooth shaped for an artificial crown positively without pain. Care must be exercised to have the syringe and needle and the tooth and gums clean.

It is best to spray the mouth and scrub the gums with the antiseptic at the area where the needle is to be inserted. Also a small spot should be made with iodin or formocresol at the point of insertion of the needle.

The anesthetic is about one-tenth as toxic as cocain, but should any toxic symptoms manifest themselves, whisky or alcohol in any convenient form administered internally is a perfect antidote.

The operation consisted in the removal of a pulp from an upper left second bicuspid and the preparation of a cervical cavity in an upper left canine. The patient was a young woman of nervous temperament. The result was satisfactory, and the operation painless.

Dr. W. T. Jackman, Cleveland, Ohio, "High-Pressure Anesthesia."

The clinician prepared a mesio-occlusal cavity in a lower left first molar, as follows:

With a No. 3 round bur the clinician drilled into and about one-third of the way through the enamel, immediately outside (buccally) of the line of decay; then with a No. ½ round bur he drilled through another third of the enamel; then used the Myers syringe, and after filling the barrel with a 2 per cent. solution of cocain hydrochlorid placed the point in the above pit, exerting all the pressure possible by squeezing the handles. After about thirty seconds the solution was forced through the remaining third of the enamel and a little into the dentin. After this the No. 3 bur was used until the dentin was reached. Then a little pit was made in the dentin by the No. ½ round bur, and the syringe was again used for two minutes, when the tooth was found to be completely desensitized, after which the cavity was prepared by taking in the syringe pit, without any pain whatever, much to the joy and comfort of the patient.

PULP TREATMENT—DEVITALIZATION.

Dr. C. A. Steuerwald, St. Ansgar, Iowa. "Removal of Pulp by Pressure Anesthesia and Immediate Root-canal Filling with 'Formaldoxote.'"

The patient, man of about forty, presented an abraded upper right central incisor. There was no exposure of the pulp, but the dentin was sensitive. Two applications of cocain were therefore made before the pulp could be reached. After the third application, however, the pulp was completely removed without pain.

Considerable hemorrhage followed. A smooth broach, wrapped with a little cotton saturated with Formaldoxote and placed in the canal for about two minutes, completely controlled the hemorrhage. The root-canal was then filled with Formaldoxote liquid and powder mixed to the consistence of a creamy paste, a gutta-percha point inserted, and the cavity sealed with cement.

The operation was a perfect success.

MATERIA MEDICA.

Dr. J. P. Buckley, Chicago, Ill. "Pathological and Materia Medica Exhibit."

This clinic consisted of an exhibit of pure drugs and their combinations in remedies used by the clinician in dental therapeutics. The reasons for each constituent in the various remedies were given. Dr. Buckley emphasized the importance of studying the pathology of the various dental diseases, and the application of such remedies as are truly indicated in the treatment of the condition existing.

PROPHYLAXIS.

Dr. C. S. Starkweather, Bellaire, Ohio. "Potassium Sulfocyanate Experiments in Prophylactic Dentistry."

For the potassium sulfocyanate treatment we are indebted to Dr. Frank Low of Buffalo, N. Y. He claims good results from its use in preventing dental caries.

My clinic shows a few samples of saliva taken from my patients before and after treatment, with a brief history of each.

This treatment has worked wonders in a class of young patients whose teeth are rapidly disintegrating in spite of the

care they have been able to give them. I have not used it long enough to say that it will give the expected results in all cases. That could hardly be looked for, but it is a long step in the right direction toward preventive dentistry.

Parke, Davis, & Co. prepare the tablets after Dr. Low's formula, and they may be procured from them.

I use the one-half grain tablets, and prescribe one tablet each day the first week to be taken at bedtime, one every other day the second week, and one a week thereafter, till all are taken. Thirty-five tablets should be given, and the use of lime-water as a mouth-wash should be insisted upon.

The test for potassium sulfocyanate is made as follows: A clean sample of saliva, about one dram, is obtained. This is diluted with an equal quantity of distilled water; four drops of ferric chlorid are added and the mixture is shaken well. If the color becomes a deep red wine hue, potassium sulfocyanate is present; if it is a light yellow, there is little or no potassium sulfocyanate present.

Tests were made of saliva obtained from members present, and results noted.

PYORRHEA ALVEOLARIS.

Dr. E. R. Vaughan, Denver, Colo. "Pyorrhea Cases with Permanent Retainers."

Fixation of teeth loosened by pyorrhea is one of the essentials in the treatment of this disease, extreme looseness requiring the establishment of absolute firmness before recovery is possible.

The splint which I am showing can be relied on in every case to maintain the required rigidity and to hold the loosened teeth for any length of time with perfect solidity.

The construction of this appliance is extremely simple. The loosened teeth and the immediately adjoining firm ones are drilled labio-lingually and countersunk labially with a cone-shaped reamer. A backing is shaped to the lingual surface of the teeth, either by swaging, burnishing, or casting; threaded iridio-platinum pins are adjusted to the drilled holes, and finally the whole appliance is anchored, first by cement and then by screwing upon the threaded pins cone-shaped nuts which fit into the countersunk holes and hold the teeth rigidly in place. In hundreds of cases in which I have used this appliance the percentage of failure has been remarkably low, and those of my *confrères* who have adopted it advise me that their results have been similar to my own.

For all bridge attachments in the six anterior teeth I use the same appliance, with the modification of grinding a slot across the lingual surface of the tooth as a resting-place for the backing, thus transferring all strain from the pin to the tooth itself. Try it for yourself and make the strain of pyorrhea treatment a joy instead of a burden.

Dr. W. F. Spies, Pittsburg. "Pyorrhea Cases Under Treatment with Dentinol and Pyorrhocide."

Case I. The patient has been under treatment four weeks. On presentation for treatment, the gums were highly inflamed, exuding considerable pus, and very sore. Treatments were given every third day. As shown in this clinic, the gums presented a healthy pink condition, the flow of pus had stopped, and the loose teeth had become firm.

Case II. The patient has been under

treatment for three weeks. The gums showed an inflamed condition, with pus of a white color issuing from the lower centrals, laterals, and upper right bicuspids. The pockets were deep, as shown by X-ray pictures. As shown in the clinic, the gums have become healthy, and there is no pus.

Case III. When presenting for treatment, the patient showed the following conditions: The gums were highly inflamed, bleeding easily, and exuding considerable pus. The teeth were loose in their sockets. This case had received four treatments previous to the clinic. The gums showed great improvement, with no bleeding and no pus; the teeth were firmer. The patient was treated at this clinic in order to demonstrate instrumentation, application of Dentinol, and instruction of the patient as to the proper use of Pyorrhocide.

FILLINGS AND INLAYS: CAVITY PREPARATIONS, GOLD, CEMENT, AMALGAM FILLINGS, AND CAST INLAYS.

Dr. J. V. Conzett, Dubuque, Iowa. "Preparation of Mesio-occlusal Cavity in a Molar for Gold Foil or Cast Inlay Filling Without Change in Cavity Shape."

The cavity was in the mesio-occlusal surface of an upper right first molar. The cavity was prepared for the reception of an inlay model, which was made and withdrawn to show the possibility of making the inlay in the cavity. After inspection by the members, the same cavity was filled with gold without any further preparation. The filling was accomplished by filling the gingival surface with non-cohesive cylinders, and finishing with cohesive foil.

Dr. E. H. Ballou, Dodge City, Kans. "A Two-piece Matrix for a Gold Inlay, Including Cavities in Anterior and Posterior Teeth."

In anterior teeth the cavity is excavated in the same way as for a gold filling, except that no deep undercuts are made.

Fig. 1.

Fig. 1 illustrates the matrix folded over the cavity, and a hole cut in the matrix so that it will fold over the margin of the cavity without crimping.

Fig. 2 illustrates the matrix after it has been burnished to the margins of the cavity, the edges trimmed and finished at the cervical margin, and fiber

Fig. 2.

gold added to cover the rent in the base of the matrix and soldered with 20-karat solder.

Fig. 3 illustrates the folding of a piece of 22-karat, 30-gage plate to restore the contour, the edges being drawn together to the width of the tooth corresponding to the distance of the tooth from the labial to the lingual surface. After fold-

ing, the plate is trimmed until it restores the shape and size of the lost tooth structure.

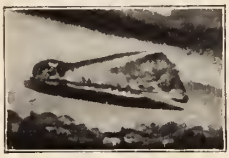
Fig. 3.

Fig. 4.

Fig. 4 illustrates the hollow of the contour filled with 20-karat solder.

Fig. 5 illustrates the matrix and contour placed on an asbestos block in their proper relative positions. At this stage

Fig. 5.



heat is applied, until solder unites the two pieces. If there is any depression after they are united it is filled in with 20-karat solder. Care must always be taken to paint the surface next to the face of the cavity with chalk or some other substance to prevent the encroachment of solder.

Fig. 6.

Fig. 6 illustrates inlays in position, and also an inlay with pin attachment on the cutting edge of an anterior tooth that is formed in the same way.

For the construction of an inlay for an approximal occlusal cavity in a posterior tooth the cavity is prepared in the same way as for a gold filling, except that the margins on the approximal surface are trimmed to a plane with a large

Fig. 7.

vulcarbo disk, as in Fig. 7, always extending the cavity across the occlusal surface, as in Fig. 8.

The matrix for the occlusal surface of Fig. 8 is constructed by trimming it to the approximal margin, as in Fig. 7. The matrix is removed and to it a piece of 22-karat, 30-gage plate is lightly soldered to cover the approximal surface. The

Fig. 8.

matrix is replaced in the cavity, trimmed, burnished to the margins, and the fiber gold is added to the cavity in the occlusal surface and filled in with solder in the same way as for an anterior tooth.

The inlay is then placed in the cavity, the margins on the approximal surface are burnished, trimmed, and finished at this surface. Then solder is added and a strip is attached near the surface margin

that corresponds to the width desired for the tooth approximation, as in Fig. 9.

Fig. 9.

The inlay is placed in the cavity and then a strip is pressed over against the approximal surface of the adjoining tooth as in Fig. 10. The strip is trimmed to the

Fig. 10.

occlusal surface, and the crevice filled with fiber gold. The piece is removed and solder flowed over this framework, thus producing the results desired.

The fiber gold spoken of has wax incorporated in it to the point of saturation. This enables the gold to be worked with an egg-shaped burnisher in about the same way as pure wax. To remove the wax, the gold is invested in asbestos and chalk, heated immediately, but gently, care being taken not to boil the wax. After it is thoroughly dry, flow the 20-karat solder.

Dr. F. A. Roe, Burlington, Iowa. "Casting Gold on Porcelain."

The technique of this clinic was as follows:

The sprue is set by placing it so that the molten gold will be thrown directly against the investment, or the metal of the post or cap if such be present.

In backing up dummies, a backing of No. 36 gage, 24-karat, greatly facilitates the process. In casting Richmond crowns, after the cap and pin are made, the backing as above serves a similar purpose, viz, taking up a portion of the heat of the molten gold and thereby lessening the heat to the porcelain and pin of the Richmond crown. More than this, throwing the molten gold directly upon the cap and pin causes a stronger union, and with the cast in position, casting directly in the setting of a detachable post crown, no backing was used. The wax is placed upon the tooth, and with the pin in position in the root the porcelain is pressed to position. After the necessary trimming and replacing any distortion which may have occurred while trimming is corrected, the sprue is placed so that the molten gold will first strike the investment and post. The post is brought to a higher heat, and as molten gold rises about the porcelain and into and around the post, the possibility of checking the porcelain is reduced to the minimum. Moreover, the added heat upon the post precludes the possibility of the gold not flowing to the end of the post and completely filling the same. For casting the adaptation of a Logan crown, the sprue is placed so that the molten gold will strike the investment and the post therein contained; then, as the gold rises to the porcelain, its temperature is reduced. In casting upon vulcanite teeth, the pins are enveloped in gold foil, the sprue being

so placed that the gold strikes the investment first, then backs up upon the porcelain.

Each of the above operations was made with a lever machine, and showed satisfactorily that the technique employed produces definite results.

Dr. J. F. Wallace, Canton, Mo. "Gold Filling."

The operation was made in the lower first molar, involving the mesio-occlusal surface. The cavity preparation was made with flat seats, parallel walls, with the margins well extended, securing self-cleansing areas for all cavity margins and smooth surfaces against which to finish the filling.

Two and one-half sheets of soft foil were used in the cervical portion of the cavity, cohesive foil being used in the occlusal portion, starting in the distal portion of the occlusal, building anteriorly over the soft foil already placed in the gingival portion of the cavity.

The contact point was secured by condensing pellets of gold directly into the mesial portion of the filling and against the distal portion of the second bicuspid, thus increasing the interproximal space between the teeth and gaining additional separation thereby.

The mesial surface of the filling was finished by sawing out any surplus of gold with a Black saw and finishing files, completing it with strips up to the contact point, when a Perry separator was adjusted, and sufficient space gained to enable the polishing of the contact point without the loss of any space gained for the preservation of the interproximal space. The occlusal portion of the filling was finished with gem stones, disks, and pumice.

In the finished operation the embrasures were well opened, inviting the passage of food through them in the process of mastication, securing the full benefit of the cleansing effect upon the cavity margins and the linguo- and labio-gingival angles of the filling.

Dr. Herbert C. Miller, Portland, Ore. "Exhibition of Enlarged Models Made of Paraffin and Japan Wax, Illustrating Cavity Preparation for Filling and Extension for Prevention of Recurrence of Caries."

The following specimens were exhibited:

Upper central incisors with cavities upon the incisal surface extending from the gingival to the occlusal, including the restoration of the incisal angle.

One incisor with an occlusal step and lingual surface extension, as required in case of a long slender crown, and one with a lingual step conserving the occlusal edge, this form being recommended when the crown is sufficiently thick to furnish the width of the filling for strength.

One central incisor with simple approximal cavities, with the lingual walls almost entirely removed: the labial walls were extended sufficiently to enable the fillings to reflect light, also upon the mesial surface; the occlusal margin was not extended beyond the contact point, which prevents weakening the incisal angle, and a new contact is made upon the filling gingivally of the original contact point.

Bicuspids illustrating occlusal restorations and cavities occupying the gingival third of the labial surface. Three upper first bicuspids, one with mesio-occlusal cavity, one illustrating mesio-disto-occlusal cavity preparation when the pulp is alive, and one showing the difference in

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New York

preparation when the pulp is dead, the chief difference in preparation made necessary by loss of the pulp being the removal of the occlusal ends of the cusps to admit of sufficient thickness of filling material to protect the buccal and labial walls from injury. The buccal and lingual occlusal margins are beveled so as to incline slightly toward the gingival, and anchorage is secured in the root portion of the pulp chamber.

Disto-occlusal cavity in a lower second bicuspid having lingual inclination, the cavity walls being inclined to the buccal surface for convenience.

Lower molar with cavities in the occlusal surface and the gingival third of the buccal surface, illustrating mesial inclination of the cavity walls for convenience of insertion of filling materials.

Dr. Otto J. Fruth, St. Louis, Mo. "The Hollow Gold Inlay—Method of Making."

The cavity is prepared, and a wax impression is taken as for the ordinary cast inlay. After the wax model has been properly attached to a sprue wire, it is ready to be hollowed out.

This is done by means of the Roach Suction Wax-carver, which consists of a fiber tube, about six inches in length, which incases a metal tube of the same length. To one end of this tube a piece of rubber tubing is attached, while at the other is a separable metal bulb, which is hollow and allows a small pledget of cotton to be placed within by simply unscrewing the cap of the bulb, to which in turn a hollow needle-pointed tube is attached, through which the wax is drawn, after the needle point has been heated, by suction applied at the other end through the rubber tubing.

Advantages over ordinary inlays. (1) Better anchorage is secured for the cement. (2) This method allows a larger bulk of cement to be placed over the pulp of the tooth, thereby preventing shock due to sudden thermal changes. (3) A great saving of gold, as it reduces the bulk in some cases at least 50 per cent.

Dr. T. C. Hutchinson, Decorah, Iowa. "Methods of Making Solid and Hollow Wax Crowns, Making the Pin Facing Detachable, and Making the Backing for a Steele or Any Other Facing."

The first demonstration was that of making solid wax dummies by using ordinary base-plate wax on account of its pliability, heating over a lamp until it is of such consistence that it will stretch, and rolling it into shape to fit a mold that has been selected for the case on a wax-molding plate. The wax is pressed into said mold, forcing it to place with a stick or old instrument until the occlusal and buccal surfaces have been reached. Air and moisture in the mold must be expelled in the act of forcing the wax. The surplus wax is cut off with a hot spatula, and the wax dummy removed. This dummy is then placed on an articulator and bent to secure the natural contour of the arch, holding the articulator closed while accomplishing this. While the wax is still soft, it is pressed to occlusion.

To make a hollow dummy, sheet wax is softened in the same way as for solid dummies, laid over the mold selected, pressed down as far as possible with the finger, and then, with the aid of a small piece of vulcanite rubber and a small match or the like, to the bottom of the mold. This dummy can be made as thin or as heavy as desired, depending on the thickness of the wax used. The occlusion

is obtained in the same way as for solid dummies. The occlusal surface is reinforced as judgment dictates. At the same time the buccal surface can be made as thin as desired by scooping the dummy out with a spatula. A bar of S. S. W. platinoid is then run through the hollow wax dummy longitudinally, allowing it to protrude on either end, and the hollow part of the dummy is filled with investment material. When this has hardened, the palatal or lingual surface is waxed up in such a way as the finished dummy is intended to be. The sprue is then placed, and the piece cast. When cast, virtually a hollow dummy is obtained filled with investment material. The platinoid bar serves two purposes, viz, that of retention for the investment material during the process of burning out the wax and of casting, and next to act as a brace for the walls of the dummy. By this method a better dummy can be obtained than a solid one would be, and a considerable amount of gold is saved.

The clinician next showed a method of making the pin facing detachable. The facing is selected and ground to fit the case, and then placed in a mold that will hold it. A little oil is put on the pins of the facing, inlay wax is heated and is pressed against it. As the wax is soft, one can use considerable force without endangering the facing. The surplus wax is cut off with a hot spatula, and the wax removed from the mold. This gives a wax dummy with the facing attached, with a surplus of wax over the margins. The occlusion is then obtained, and any overlapping wax is removed. After cooling the wax, the facing is loosened with a finely pointed instrument, the facing coming off very easily. The facing is once more replaced to make sure that the wax has not been distorted. The success of this procedure lies in the prevention of any distortion of the wax.

In making the backing and dummy for a Steele or other detachable facing, the same procedure is carried out as in making the pin facing. The slot of the facing must be oiled to prevent any distortion of the wax post after sliding off the facing. By making the backing for these facings, a better backing is obtained than could be bought, because it fits the facing absolutely correctly, and requires but very little cement for holding it in place. The less cement is used the better, and the more lasting the facing will be. It is the excess of cement back of the facing which in time dissolves and causes all the trouble. The facing in such a case is not held firmly, and very little force from one direction or another will suffice to chip it off.

The clinician also showed the method of making a dowel crown with a facing attached. This operation is made in the mouth. The root to be crowned is ground, and the facing selected is then fitted according to judgment. After placing the iridio-platinum post in position and bending that part of it which is to come into contact with the crown palatally, a little 16-karat gold solder is put on the end of the post. The reason for this is to insure a perfect union with the cast gold; when molten gold lies against it, the solder will melt and form a union. The facing is placed in a mold in the Hutchinson wax molding plate No. 2 (anterior plate), and the slot of the facing is oiled. If a pin facing is used, the pins are oiled, and inlay wax is pressed against the facing, filling the mold entirely. Any surplus of wax is cut off, and the piece is removed from the mold. The operator now has the wax form with the facing attached to the

anterior tooth, and a little surplus of wax. Holding this form between the index finger and thumb, that part of the wax is heated which is to go against the root and post. The advantage of this method of making a crown is that it can easily be adapted to place, correct alignment can be obtained, and perfect adaptation to the root is insured. The operator knows how his finished work will be before he casts. The wax is cooled before the patient is allowed to bite, and removed. Then the occlusal and palatal surfaces are trimmed, and the indentation of the roots being pronounced, the wax is trimmed, following the line of the root. The piece is then placed in position in the mouth to be certain that no distortion has taken place, and if there be any, it is corrected. If the piece is perfect, the facing is loosened with the finger-nail and slid off, care being taken not to distort the wax post.

Dr. D. O. M LeCron, St. Louis, Mo. "Possibilities in Casting Gold."

This clinic showed some of the possibilities of casting gold. The exhibits of dental work, jewelry, and reproductions of leaves, insects, etc., in gold were beautiful.

Of dental work castings were exhibited that were both directly against porcelain and, by removing the facings and inserting graphite pins in the pin-holes, also inlays for cavities of various types, crowns, etc. In reproducing insects and small leaves the clinician removes the objects by burning them out, then inverting the flask or ring, and blowing out the ashes with compressed air. For large leaves and other large objects a separable flask or ring is employed.

Dr. E. P. Dameron, St. Louis, Mo. "Cavity Preparation for Inlays."

This clinic consisted of cavity preparations in plaster models representing the anterior teeth for inlay work of all kinds. The clinician also showed LeCron's method of using a "shield" of pure gold placed in the cavity before pressing the wax to place.

Dr. O. H. Cressler, North Platte, Neb. "Non-cohesive Gold Filling."

The clinician demonstrated the use of Williams' No. 4 soft gold foil in an occlusal cavity in a lower second molar, using Black's method of cavity preparation.

Dr. G. R. Warner, Grand Junction, Colo. "Amalgam Restoration."

Essentially, this clinic consisted of restoring the major portion of a lower right first molar, the buccal wall only being left.

The cavity was prepared with a broad base, no other retention being used. The margins were well beveled, and on the lingual side were carried under the gingivæ.

A soldered band matrix was used, which was not removed at that time. It will be removed at a subsequent sitting, when the filling will be finally polished.

Dr. C. E. Beeman, Cedar Rapids, Iowa. "Gold Filling for a Mesio-occlusal Cavity in an Upper Bicuspid, Using Unannealed Foil in the Gingival Third of the Cavity."

This clinic consisted in the making of a gold filling for a mesio-occlusal cavity in an upper right second bicuspid tooth. The cavity was prepared according to G. V. Black's principle of preparation of this class of cavities. Williams' No. 4 soft gold foil was used throughout in making the filling, four one-fourth sheet

cylinders of annealed foil being employed in filling the cavity from the gingival to the pulpal wall. The rest of the filling was made with annealed one-eighth and one-sixteenth sheet pellets.

No. 2 (Conzett pattern) plugger point and hand malleting were used in condensing the filling. The filling was finished with trimmers, stone disks, strips, and pumice.

The gold cylinders are made by taking one-fourth of a sheet of foil, folding and refolding it until a cylinder of the required length is obtained; this is then rolled on a jewler's broach to and from the cylinder. The pellets were made of square portions as indicated above, and loosely rolled into pellets.

It will be noted that the cavity preparation was made after Black's principle, and that the filling represents an attempt to carry out the method of Dr. Wedelstaedt of St Paul, which is being taught us by the members of the Wedelstaedt Club.

Dr. Thos. P. Hinman, Atlanta, Ga. "Cavity Preparation for Inlay Work."

The clinician showed a number of large plaster models in which cavities were carved to demonstrate the correct methods of cavity preparation for gold inlays.

Dr. F. T. Daly, Cambridge, Neb. "Cast Inlays for Opening the Bite."

There are many cases of abrasion affecting the entire set of teeth, which are usually in good condition. It is not probable that the operator wishes to devitalize all these; rather, he would restore them without devitalization. For this purpose with a carborundum stone all thin margins of enamel are smoothed off, and the occluding surface of the tooth is made as nearly uniform as possible. With a small bur of the size of 22-gage platinum wire, four holes are drilled in the molars, two in the bicuspids, and two in the anterior teeth, about one-eighth of an inch in depth. In these holes 22-gage platinum wire is inserted, the pattern and bite are carved in wax as desired, and the inlays are cast, using 20-karat solder for posterior and 22-karat for anterior teeth, on account of the better color and in order to withstand the stress. Bridges may be cast with the inlays, making ideal abutments. The inlays are cemented to position, and an ideal means of opening the bite is obtained that will stand the extreme stress of mastication found in such cases. If it is desired to use a gold crown for an abutment in close bite, the band is fitted and trimmed down even with the tooth with a carborundum stone, 1/1000 inlay platinum is burnished over the tooth and band, and removed, and the band and platinum are attached with a very small piece of 20-karat solder. The crown is invested, and 18-karat solder is flowed over the occlusal surface. This crown possesses the greatest possible resisting force, requires the least possible amount of gold, and its insertion causes very little discomfort to the patient.

Dr. W. K. Sinton, Colorado Springs, Colo. "Advantages of Cement Linings Under Fillings."

(1) The adhesiveness of the cement makes the anchorage of the filling greater, facilitating to a certain extent the shaping of cavities.

(2) The cement supports and strengthens weak cavity walls.

(3) The cement prevents discoloration of the teeth, and prevents amalgam from showing through thin cavity walls. This

feature is especially advantageous in filling the teeth of young people.

(4) The cement lining prevents the rocking of the gold in beginning a gold filling. By using a cement lining and a properly shaped plugger, a gold filling may be started with one hand, though two hands are usually required if the lining is not used.

(5) The lining protects the pulp to a limited extent from thermal changes. In cavities, however, where caries has penetrated near to the pulp, it is advisable to use a less irritating pulp capping under the cement.

(6) The lining makes a closer union between the filling and the tooth structure than it is possible to obtain with metal fillings alone.

The method of procedure demonstrated by the clinician is as follows: The cement is mixed to a creamy consistence, and enough of it is placed in the cavity to completely cover the walls. Then the soft amalgam is packed at once, pressing it well into the cement. The surplus cement should be scraped from the cavity margins, after which the filling is completed with amalgam in the ordinary way. When using gold it is well to wait a few minutes for the cement to harden after packing in the first few pieces, which should be Solila or some similar gold.

Dr. J. Fremont Burket, Kingman, Kans. "Immediate Root-filling."

The patient presented an upper lateral incisor with exposed pulp. The method of operation is as follows: The pulp is extirpated under pressure anesthesia with cocain crystals pressed in with vulcanite rubber. After the pulp is removed the cavity and canals are washed and thoroughly cleansed with hydrogen dioxid. The canals are dried with bibulous cones made by cutting little triangles from sheets of bibulous paper and twisting them into cones, which may be made of any size to suit the case. This is followed by applications of hot air to the canals. After the canals are thoroughly dried out, a little powdered iodoform is placed in the pulp chamber, and with a small plugger a little of it is worked into the canals. Then a gutta-percha point is selected small enough to be gently carried to the apex of the canal. If more than one canal is present, a point is placed in each. Then, with a small drop syringe made of a little glass barrel with a platinum point and a rubber bulb, a drop of chloroform is dropped upon the gutta-percha point, which will immediately follow the gutta-percha point to its apex and dissolve it. As soon as the point is dissolved, another gutta-percha point is forced into the cavity, thereby forcing the gutta-percha, which is then chloro-percha, into the recesses of the canal.

This is repeated until all the chloroform is evaporated and the canal is filled.

CROWN AND BRIDGE WORK

Dr. H. J. Frank, Chicago. "Porcelain Jacket Crowns."

On an extracted tooth prepared as for a gold crown, with a square shoulder cut slightly above the free margin of the gum, a matrix made of platinum one one-thousandth of an inch thick was burnished carefully about the crown and shoulder, and the platinum was locked on the lingual side with a tinner's lock, after cutting away the excess platinum below the shoulder.

With the matrix in place on the tooth, the construction of the porcelain crown

was started by applying a very little porcelain at a time, thoroughly spatulated to eliminate all air-bubbles. This was continued, applying a little porcelain at a time and thoroughly spatulating each application, until the entire crown was covered. A second layer of porcelain was then applied in the same way, the object of which was to obtain the desired shade, and when all was well spatulated and the porcelain dried, the tooth was placed in a furnace and in about twenty minutes raised to a heat of 2560° F., when it was removed, the result being a beautifully translucent and lifelike tooth.

The porcelain used in this case was the S. S. White Dental Manufacturing Co.'s special high-fusing porcelain, or what is known as their 2560. The crown was completed in one bake, and the baking was made in an S. S. W. furnace.

Dr. W. E. Kennedy, Indianapolis, Ind. "Wax Pattern for a Casting by Using a Circular Matrix."

The clinician demonstrated the advantage of using a circular matrix that can be tightened and released while in position on the tooth in making a wax pattern for simple or compound approximo-occlusal cavities, or for a crown with a facing, a porcelain crown with a gold joint, or other cases in which there are no walls to hold and guide the wax in a dense, non-spreading mass.

To make a wax pattern for a simple approximal cavity a band is cut to suit the case, slightly curved for a bell-shaped crown, and fitted to the tooth. The bite is tested, the band loosened slightly, and removed. A suitable piece of wax at proper temperature is placed in the matrix, and passed over the tooth partly in advance of the matrix band. This is all-important, to insure the carrying of the wax to the base of the cavity and the covering of the cervical margin. Then, with firm finger pressure exerted on the wax and band, both are carried to the point desired. The matrix band is tightened, and the patient is allowed to bite into the wax, and to give his jaw a lateral motion as in mastication; all excess of wax is removed with suitable instruments, preferably flat burnishers. The patient is then allowed to close his jaw again. The matrix band is slightly loosened and removed from the tooth, the wax displaced from the band, and any carving or trimming desired is done outside of the mouth. The wax is replaced in the cavity without using the matrix, the final carving or burnishing is done, and the operator may proceed as in any other case. This insures a solidly compressed piece of wax, so to speak, filling the point and line angles to a nicety, absolutely without spreading or distorting the wax. The more extensive or complex the cavity, the more advantageous is this method of carrying the wax to place accurately.

It is not necessary to describe the technique for making a wax pattern for a crown, as practice will demonstrate the practicability and pleasing advantages of this method in different forms of crown work.

Dr. C. A. Martin, Winfield, Kans. "Mosquito Hemostatic Forceps and Other Contrivances."

The clinician demonstrated the use of the Mosquito hemostatic forceps as a convenience in handling and polishing inlays, applying ligature wires in orthodontia, holding pins or fastenings in grinding the same, holding an orange-wood stick for polishing the teeth at any angle, and numerous other little opera-

tions in which these forceps will suggest themselves from time to time.

The clinician also demonstrated the adaptability of the Evans root trimmer No. 2 for trimming down the stumps of teeth in crown work, also their adaptability in filing vulcanized dentures, using them in both straight and right-hand angles.

He also showed a cement syringe made from a common glass syringe, holding about one-half ounce. This can be secured at any drug shop. It is placed over a Bunsen flame and drawn out to a fine point. This point is broken off, leaving the opening just large enough to permit of the expulsion of the liquid cement one drop at a time, under pressure exerted upon the plunger.

The clinician furthermore demonstrated the use of the jeweler's common screw-head file to be used in many operations where finer or closer work is needed.

Dr. L. P. Davis, Lincoln, Neb. "A Method of Making Gold Crowns and Securing Normal Occlusion Without an Articulator, and Using Metaline."

The tooth to be crowned is trimmed and ground as usual, the band is made, contoured to fit the tooth, and trimmed a little short of occlusion. A stick of Metaline is heated at one end over a Bunsen burner or alcohol lamp until it becomes soft and plastic, and kneaded gently between the thumb and index finger. Enough of the soft Metaline is cut off to form a cusp, placed on the band, the patient is requested to bite into this, and the band is removed and carved to shape.

After carving the cusp, it can be given a smoothly polished surface with a dry brush. Next the cusp is removed from the band, laid on a piece of sandpaper, and with the finger rubbed back and forth until the part that may extend into the band is on a level with the margins of the cusp.

The cusp is covered with a coat of glycerin by using a small camel's-hair brush, and then laid on an iron slab. A rubber ring is placed around it, and Melotte's metal is poured over it, and allowed to cool. To prevent the too rapid congealing of this metal, a thin piece of paper is pasted over the cooling block.

The Metaline cusp is removed with an instrument, and the die is ready for swaging. The gold is swaged into the die, any surplus gold is trimmed off the cusp, and the cusp placed back in the die, laid flat over a piece of sandpaper and trimmed to the surface of the die. After removing, the cusp is ready to be soldered to the band.

By this process, with the use of Metaline, the operation is shortened, there being no plaster casts to be poured nor impressions to be made in moldine or other material, and no change in the articulation as it was originally carved is necessary. In fact, the nature of Metaline is such as to withstand a heat at which other metals fuse, neither contracting nor expanding, thus producing a smooth and perfect die. Anything that can be designed by carving is readily and accurately produced in a metal die by the use of this material.

Dr. Edward E. Haverstick. "Porcelain Work."

The clinician exhibited porcelain crowns with detached posts and cast gold diaphragms.

He also demonstrated the following method: In cases where the gum has receded and a labial cavity extends to the gingival margin, which is to be filled

with a porcelain inlay, the long appearance of the tooth may be prevented by imparting a pink color to the gingival portion of the inlay to match the gum.

This method may be used when the gum has receded on a tooth that is to be crowned, by baking the porcelain on the labio-gingival portion of the crown, and shading it to match the color of the gum. This method may also be used for facings which are to be used for bridges on anterior teeth, but in this case the coloring is all that need be added, as teeth of sufficient length may be secured.

Dr. W. A. Heckard, New York city. "Tipping Teeth with Iridio-platinum, and Blowpipe Demonstration."

While iridio-platinum tips are mostly called for in the six anterior teeth, they may be used in many other cases. Teeth do not break off the crown or bridge if they are properly tipped with this stiff metal.

The incisal edge is ground horizontally at a slight angle in order to give the tooth or facing a feather-edge, and backed up with soft platinum of 32 or 34 gage. The platinum backing is allowed to extend slightly all over by one-sixteenth of an inch or more. The platinum is burnished snugly to the porcelain, and with a sharp pocket-knife a little shaving is stripped off the pins, which are bent at right angle closely down to the backing. This will hold the backing in place. A very minute piece of plate gold of 22 karat is placed between the pins, and the whole backing is painted, excepting a very small zone of about one-eighth of an inch around the pins, with prepared chalk, which acts as a "block-out," and will keep the gold from flowing over the whole backing. After cooling, the backing is burnished again, and the backed-up tooth is placed in some fiber asbestos. A strip of iridio-platinum of about six inches long, three-thirty-seconds of an inch wide, of No. 28 gage, is balanced across the tip to be reinforced, so that all of the strip except the portion to be used will be on one side of the tooth. Its weight will balance and keep it there while it is soldered with 22-karat solder. After cooling, the long piece of iridio-platinum is cut away, and the piece is finished with a file to suit the case. Soft platinum and iridio-platinum in strips can be secured by order from Baker & Co., platinum refiners, New York city, who have several combinations of iridio-platinum. The clinician uses a medium hardness.

The advantage of using platinum in long strips is that it does not move away in soldering, as small pieces of the size of the tip do at times. A soft brush flame should always be used, and the teeth or facings will never have to be invested in soldering on them. The blowpipe flame must be kept moving. The clinician soldered several backings on tips of iridio-platinum without checking any. He passed the flame over his fingers, passed his white silk tie through the flame, worked the flame across his shirt front, and all over his face as if it were but a paint brush, demonstrating that, if the blowpipe flame is kept moving there is no danger of checking a tooth. He also picked up a tooth by the pin with platinum-nosed pliers, dipped it in water, and began passing it through the blowpipe flame immediately, gradually drying it, and then bringing it up to a red heat. After cooling, the tooth could not be distinguished

from a number of similar teeth. The same tooth was heated up a dozen times or more.

The clinician also demonstrated several other procedures not comprised in the title of his clinic, such as sweating bands, explaining the principles thereof, and showing how very easy this procedure is when understood, and demonstrating the sweating of several bands. He also exhibited several unique specimens of Taggart inlays, consisting of cast cusps for shell crowns of hardened gold, cast contours for upper molars, and porcelain molars for the lower jaw, using Taggart inlays to make the gingival joints tight. He also demonstrated castings on porcelain, carving laboratory wax for cusps, afterward transferring them into a direct method by using Taggart wax as in making any other Taggart inlay. The clinician also demonstrated a casting ring in sections, a long sprue of five inches, a special crucible-former for the same with a hole penetrating it, and with a set-screw in the crucible-former at right angle with the sprue wire for the purpose of raising or lowering the wax model and holding it firmly while flasking.

Dr. L. D. Matthews, Denver, Colo. "Cases in Removable Bridge Work."

The clinician showed two cases of removable bridge work in mouths affected with pyorrhea:

(1) A ten-tooth bridge of six roots, all strengthened by securing the roots together and equalizing the pressure. The patient uses this bridge with much comfort. The immobilization of the roots prevents any further spread of the disease. The removability gives access to treatment and repair.

(2) A saddle bridge with the saddle pressing on the tissues and secured by the weakened roots, being held firmly in position. This prevents tooth movement, making the weakened members last longer, besides rendering comfortable service.

Dr. J. H. Solecki, Topeka, Kans. "Perfect Adaptation of Porcelain Crown with the Aid of Low-fusing Metal."

This procedure can be carried out in less time than by grinding the root. It makes a perfect contact, and the crown is less liable to loosen. A plain vulcanite tooth can be made into a perfect crown.

Dr. S. S. Noble, Wichita, Kans. "An Interdental and Subdental Splint."

The patient was a young man of about twenty-two years, who had received a blow on the side of the face, breaking the lower jaw between the canine and bicuspid.

An impression was taken of both the upper and lower jaws, and a cast made of each. The lower jaw was made to articulate with the upper jaw after having been placed in the articulator, and the anterior teeth were separated about five-eighths of an inch, when a splint was made for both the upper and the lower jaws. A space was left between the two in front sufficiently large to allow the feeding of the patient, the splints being vulcanized together on each side.

The subdental splint was made of plate aluminum of about 18-gage, molded to the form of the rim of the lower jaw, and a bridge of the same material was placed beneath the splint, running from side to side a little forward of the center, and raised in the center of the back about one inch, and in the front about one-half inch, which made the bridge pitch forward. Posteriorly, the bridge was made to roll forward, the object being to carry the bandage so as not to impinge on the muscles of the throat.

With the ordinary subdental splint, which is not protected by means of the bridge, the patient often suffers as much or more from the impinging of the bandage on the throat than from the injury of a broken jaw.

The splints were placed in position and bandaged in the usual way. Usually these splints are allowed to remain in place for about three weeks.

PLATE WORK.

Dr. HENRY MORROW, Iowa City, Iowa. "Cast Aluminum Plates."

The clinician demonstrated cast aluminum plates, using Brophy's compound for model mixing in ten per cent. powdered graphite, and polishing the model with graphite, thereby securing a smooth palatal surface.

Dr. E. A. THOMAS, Red Cloud, Neb. "Restoration of Fractured Roots."

When a patient presents himself with a fractured tooth or root, the fracture extending below the gum margin, the fractured part is extracted, and the cavity packed with some material to retain space. The fractured sliver is preserved, the crown is partly ground off as for a gold crown, with a stick of metaline or modeling compound an impression of the fractured side of the sliver is taken by warming the impression material and pressing the sliver of the root into it. All undercuts are carved away, a counter-die is taken and removed, and the sliver is also removed from the root. Warm inlay wax is pressed into the impression and carved to the shape of the sliver, warmed a little, placed in the die, and the counter-die is pressed over it until all excess of wax is removed, when an exact reproduction of the sliver of the root in inlay wax will be obtained. The inlay wax is removed, the impression of the canal or pulp-chamber in the wax giving an angle for a pin. A small pin of 20 gage of any material desired is laid in the groove and attached by running a little wax over it. The piece is then cast in gold, aeolite, or any other metal desired, cemented in place to the main body of the tooth in the mouth, ground and crowned. This furnishes an exact reproduction of the fractured part extracted, which cannot be obtained in any other way.

Dr. GEORGE H. WILSON, Cleveland, Ohio. (1) "The Burnishing of Aluminum." (2) "Finish Antagonization Grinding for Complete Artificial Dentures."

(1) The secret of burnishing aluminum consists in the use of a suitable lubricant. Equal parts of sweet oil and rum work perfectly with an agate burnisher.

(2) After the plates are polished, the dentures are replaced upon the articulator—not an occluding frame—the occlusal surface of the lower denture is covered with a paste of emery powder and glycerin, and ground against the occlusal surface of the upper denture.

Dr. G. F. AMBROSE, Eldorado, Kans. "A Cast Metal Plate, with the Metal Cast Directly to the Teeth."

The clinician exhibited a partial cast plate with the metal cast to the platinum pin teeth, *i.e.* upper left first and second bicuspids, and upper right first bicuspid. The case was a difficult one. The teeth were not checked, and the fit was a good one. The metal used was Aerdentalloy.

Dr. G. Wallace Grant, Bucyrus, Ohio. "Use of Steele Facings in Plate Work."

Most satisfactory results can be attained by the use of Steele facings in those cases where it is desired to set the teeth against the gums in either full or partial plates, or where there is considerable danger of the teeth being broken off, *i.e.* close-bite cases, anterior partials, replacing of missing teeth in different parts of the mouth, where owing to lack of room the tooth is attached to the end of a rubber arm extending between the natural teeth, and in partial cases restoring the posterior teeth, where we wish a nice fit of the first or even the second bicuspids to the gum at the anterior part of the plate, and do not want to show the rubber gum, which makes an ugly joint with the tissues of the mouth in the region just back of the canines.

The facings are selected and ground as for a bridge, and backings are fitted to them. Then a strip of platinoid plate, of No. 24 or 26 gage, about three-quarters of an inch long and nearly as wide as the backing, is bent so that when soldered to the backing with 18-karat solder in an open flame it will look like this in

cross section. The lug or arm should be attached to the backing so that it will not interfere with the backing going to its original position when the teeth have been set up again.

The lug is then notched or drilled to secure it in the rubber or metal used in making the plate. The backing is finished up and the facing placed on it, but not cemented. The lug is bent to conform to the surface of the mouth so that the teeth will be in the position desired in the finished plate, and the lug will be concealed by the material used in making the plate. The plate is then waxed up and finished like a metal or cast metal plate.

A partial plate can be cast in this way without the use of a rubber attachment, and if, perchance, a tooth should become broken, it is easily and satisfactorily replaced. Another advantage in using the Steele facing is that a better fit of the tooth to the gum is secured, because after the plate has been removed just previously to flasking, the plaster can be worked well in around the backing, filling all the spaces, so that no trouble arises from the rubber being forced between the teeth and the model in forcing them away from it, for the finished plate does not show the fit of the pin teeth to the model as when first set up.

A few trials of this method of attaching the teeth to a plate will suggest its application in many cases, with fine results.

Dr. J. W. Greene, Chillicothe, Mo. "Absolute Advance-Test Methods of Impressions, Articulation, and Other Prosthetic Work."

Dr. Greene presented his clinic, together with a seven-page typewritten report of the same, which the Publication Committee considered too lengthy to be published in this connection.

Dr. J. L. Bridgford, Macon, Mo. "Correcting the Fit of Loose or Misfit Plates Without Re-making."

The case demonstrated was an upper plate.

The technique employed was as follows: The plate was etched with a bur on the palatal side, and a thin film of

a vulcanite rubber dissolved in chloroform applied, which allowed the chloroform to evaporate almost immediately. Over this surface, Bridgford's plate paste was placed, and the plate dipped in ice-water for about five minutes. The plate was then placed in the patient's mouth two or three times, using gentle pressure each time, which caused the excess paste to be forced out, leaving only enough of the paste to compensate for the defect. The paste was mixed to a consistence suitable for taking a true impression. After the impression was obtained, the plate was vulcanized, and the impression became part of the plate.

The patient claimed that the plate was very comfortable.

Dr. Houston F. Methven, Chicago, Ill. "Anatomical Occlusion of Artificial Teeth."

A number of models and appliances were shown to illustrate the various methods of procedure in vogue in this field.

(1) Models were shown to demonstrate the compensating curve or the curve of Spee, and also to show the relation which the different surfaces of the teeth should sustain in the arch according to this curve.

(2) Base-plates were adapted to the models, and wax rims built up to represent the lost organs of mastication, and also the amount of absorption which has taken place.

(3) The wax rims were trimmed to the proper length of the bite with the facial contour restored and the face bow in position.

(4) The models were mounted on an occluding frame, and the compensating curve was established.

(5) The manner was demonstrated in which the protrusive bite was taken to establish the condyle path.

(6) The teeth were set up ready for flasking.

(7) The finished denture was exhibited.

(8) Two gum section cases were ground to three-point contact, to show the difference in arrangement in two distinct temperaments.

(9) Several boxes of artificial teeth were exhibited, representing the different temperaments, the teeth being of proper form, size, and color.

Two very excellent papers have been published on this subject, one by Dr. Prothero in the *Dental Review*, March 1908, the other by Dr. Christensen in the *Dental Cosmos*, October 1905, also many others too numerous to mention at this time.

Dr. F. C. Chamberlin, Colorado Springs, Colo. "Restoring the Facial Contour by an Artificial Appliance."

The clinician demonstrated a feature in an artificial denture which he claims is taught in but few colleges.

Rubber from one-fourth of an inch to one inch in thickness, if great fulness be required, is added as the case requires. In the upper jaw over the molars, in a sort of a swing, the rubber is shaped to drop over the teeth and yet leave space for cleansing. The same scheme is followed in the lower jaw, using less fulness.

Patients find that these plumpers are very comfortable, improving their facial appearance.

ORTHODONTIA.

Dr. H. A. Pullen, Buffalo, N. Y. "Conservation of Resistance Values in Anchorage in Orthodontia."

Models and appliances were exhibited for the purpose of showing the necessity of reinforcement of single molar anchorage in which it could be easily predetermined that the resistance of the molar was insufficient to be opposed to a greater force delivered against it.

The reinforcement of the anchorage was obtained by the use of intermaxillary force, elastic rubbers being attached from the clamp band on the molar in question to a hook opposite the canine region on the expansion arch in the opposite jaw.

It was explained that in all serious cases of malocclusion failure would ensue unless the anchorage resistance was selected with all due accord to the requirements of force used in tooth movement. In other words, the resistance at the base of the anchorage should be so reinforced that the force to be exerted therefrom in moving teeth will not displace the anchor teeth.

Dr. J. W. Fields, McPherson, Kans. "Orthodontia."

The following models were exhibited:

Models 1 and 2. A case of correct occlusion of the first molars mesio-distally, with both arches contracted. Model 1 showed all teeth in the arch. Model 2 showed the lower right and left bicuspids unable to erupt owing to lack of space due to too early extraction of two deciduous molars. No space was left for the lower second bicuspids, and but partial space for the lower right second bicuspid. The lower right and left laterals were rotated.

Models 3 and 4. The same case as above, with the impressions taken six months later, though treatment was not completed. The arch in model 3 had been removed when the impression was taken. Model 4 showed the appliance in place. This case was still under the clinician's care, eighteen months after the work had been begun. Adenoids had been removed soon after treatment had been started.

Models 5 and 6. All teeth were in the arches. Model 6 showed the bite distal to the molar with the four incisors lingual to the molar as related to the other teeth on the same model. The right canine was rotated. Model 5 showed the arch contracted so as to need expanding in order to produce a correct bite bucco-lingually, when model 6 is moved mesially. The upper right canine was rotated, the lower left canine slightly. The four upper incisors are to be moved lingually slightly after room has been secured by the expansion.

Model 7. The second bicuspid was extracted, allowing all anterior teeth to be moved distally. The clinician will move the eight anterior teeth mesially to correct their position, and bridge from the first bicuspid to the molars.

Dr. A. H. Ketcham, Denver, Colo. "Orthodontia Cases from Three to Six Years After Treatment."

Dr. Ketcham showed three cases (Kilpatrick, Hickey, Quinn), illustrations of which appear in Dr. Ketcham's paper read before the Southern Branch of the National Dental Association at Houston, Texas, May 1910, and printed in this volume at page 397.

Dr. Horace Warren, Missouri Valley, Iowa. "An Unusual Case of Orthodontia, with Models from Five to Eighteen Years, Together with Skiagraphs."

It is certainly unusual to anticipate a case by several years, and to secure a model long before any premonitory symptoms of irregularity develop. The clin-

ician lays no claim to any such prophetic vision. The patient is his own son, and the idea was conceived by the father to take impressions of the deciduous teeth before they began to exfoliate, which was done at five years of age. These impressions were preserved, likewise the deciduous teeth as they were shed, and when all had been exfoliated they were placed in the impressions which had been preserved for seven years, and the models were poured with the natural deciduous teeth *in situ* instead of teeth of plaster of Paris.

The next model, made at eight years, showed the beginning of a prognathous condition of the mandible, and a decided contraction of the maxilla. The upper arch was expanded at nine years. At fourteen, the upper canines began to erupt at a point almost exactly above the second bicuspids. The arch at this time, notwithstanding the fact that the canines were entirely without the circle, had a full complement of teeth. The distal surfaces of the laterals and the mesial surfaces of the first bicuspids were in contact. At fifteen, upon the advice of an international authority, the first bicuspids were extracted, and an original appliance was placed to bring the canines into the positions vacated by the bicuspids. As they were rotated in their sockets about 90 degrees, the appliance served also to rotate them back into a normal position. But while the crowns were brought into their correct places, the roots or the apices thereof were not changed materially, as the canines were not moved bodily through the jaw. Their positions in this respect were improved much between the ages of sixteen and eighteen years, as the last two models plainly showed.

The skiagraphs, one of each side, clearly indicated the inclinations of the roots. These were taken in May 1910. It seemed very essential to preserve the canines instead of extracting them, which would have been an easy way of avoiding the difficulty, but the face was already becoming "dished," and this condition would have been greatly accentuated instead of diminished had the canines been removed. Indeed, in all probability, the best authorities at the present time would advise the retention of all the teeth, and expansion of the upper arch sufficiently to permit the drawing of the canines into their normal positions.

Dr. H. E. Friesell, Pittsburg, Pa. "Enlarged Model of a Section of the Maxilla Including the Alveolar Process, a Canine, Two Bicuspids, and a Molar *in situ*."

The molar in the clinician's model was enlarged by fifteen diameters over the natural size.

The points exhibited were: (1) Proper form and location of the contact point. (2) Normal buccal and lingual embrasures. (3) Gingival line and its curvature. (4) Gingival area or margin. (5) Free gum line. (6) Free gum margin or gingiva. (7) Normal interproximal gum septum. (8) Abnormal interproximal gum septum. (9) Normal interproximal space. (10) Normal septal space. (11) Normal septal area. (12) Height of contour.

Dr. Friesell further exhibited the skulls of three reptiles, viz, diamond-black rattlesnake, Florida; cobra-de-capello, India; Gila monster, Arizona. These skulls demonstrated the type of fangs and teeth peculiar to these interesting animals.

Dr. M. F. Finley, Washington, D. C. "Orthodontia Models."

The clinician showed orthodontia models after the Jackson system. A particular case of a child of eleven years of age was exhibited in models with six upper and lower anterior teeth in position. The four first deciduous molars had been lost, the bicuspids were not erupted, the X ray showing the absence of dental germs of any other unerupted teeth. The four second deciduous molars were in place, also the four first permanent molars. There was distal occlusion, which was changed by the use of a plate with an inclined plane.

Dr. F. S. McKay, Colorado Springs, Colo. "Technique of Plaster Impressions."

The clinician's demonstration consisted in taking a plaster impression of the upper and lower teeth of a child, following the system commonly used in orthodontia as described in full in the seventh edition of Dr. Angle's book.

SKIAGRAPHY.

Dr. J. Terrance Williams, Denver, Colo. "The Use of the X Ray in Dentistry, with Demonstrations."

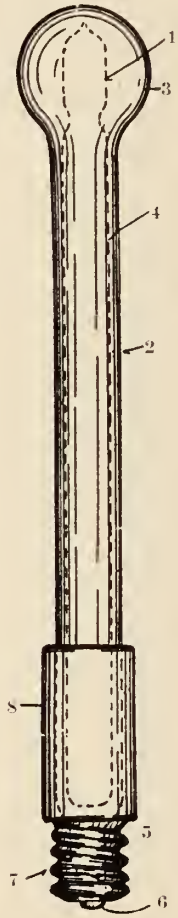
The clinician showed the technique of operation and the preparing of the films in skiagraphy, special emphasis being placed on the protection of the operator and the patient from the X ray. Several skiagraphs were taken, showing necrosed bone, impacted molars, and pyorrhea conditions.

The films were developed at the clinic, showing the method and the use of a daylight developing machine devised by the operator.

NEW INSTRUMENTS.

Dr. David Stern, Cincinnati, Ohio. "Aseptic Electric Lamp for Dental, Medical, or Surgical Purposes."

The clinician showed an aseptic electric lamp consisting of—



(1) A miniature incandescent electric lamp of about six volts, having an incandescent lamp filament. (2) Outer glass tubing. (3) Bulb of outer glass tubing. (4) Space where the air has been rarefied by means of an exhaust pump. (5) Plug with metal spreads —see 7—a conductor of electricity. (6)

The other conductor of electricity—5 and 6 connect with the lamp filament, and are insulated from each other by a non-conducting separator. (7) Threads on metal plug. (8) Metal ferrule covering the points where the two portions of the glass are connected.

An incandescent lamp will heat and will rapidly become uncomfortable to the patient if inserted directly into the mouth or any other cavity of the body. In this device the lamp is inclosed within a glass bulb, which is spaced from the lamp so that the latter cannot come in direct contact with the tissues, and can remain in the cavity of the body for a considerable time without discomfort to the patient.

In order to increase the length of time which the lamp may remain in the patient's mouth, the air between the lamp and the outer glass tubing has been rarefied by means of an exhaust pump, in order to create as nearly a vacuum as possible.

The exterior of the appliance being made entirely of glass and metal, all parts being non-porous, the lamp may be rendered aseptic in a convenient manner by inserting the same into an aseptic or sterilizing agent, and may be employed without danger of transmitting disease.

Dr. A. R. Melendy, Knoxville, Tenn. "Handpiece for Mechanical Massage of the Gums."

This instrument is made by taking an S. S. White Dental Mfg. Co.'s engine polisher for finishing fillings on the approximal surfaces of posterior teeth, and bending the arms for holding polishing strips together so that a one-fourth inch of soft rubber tube may be put over the arms and be held firmly in place. Then about one-half inch in length of the tube is cut off, attached by means of a slip-joint to any electric engine, and an ideal massaging instrument is obtained. When the engine is running at high speed the effect is a vibratory movement that is very desirable for the treatment of congested conditions and of soft and bleeding gums, or wherever a stimulating effect is desired. The rubber tubing should be carefully sterilized, and a new piece used for every patient.

Method of treatment. The gums are sterilized by the use of hydrogen dioxid or some other antiseptic agent, all deposits are removed, and the teeth are polished, especially at the gingival margins. Then massage or vibration is applied, the rubber tube being moistened with some stimulating or astringent solution.

Dr. Wilfred W. Wood, Richmond, Va.

The clinician gave a practical demonstration of the method and machine for casting any appliance, from the smallest inlay to a full denture, by centrifugal force, claiming that absolutely certain results can be obtained by that method by any dentist at small cost.

APPENDIX.

Organization of the N. D. A.

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Roe, W. J., 1210 Locust st., Philadelphia, Pa.
*Rose, E. D., Bowling Green, Ky.
Rose, J. E., Hermiston, Ore.
Ross, A. O., 807 N. High st., Columbus, Ohio.
Rossteuscher, C. F., Yankton, S. D.
*Roux, R. H., Savannah, Ga.
Ruggles, S. D., Security Bank bldg., Portsmouth, Ohio.
Rush, E. G., 402 Hall bldg., Kansas City, Mo.
Rust, Thos. L., 1408 "L" st., N. W., Washington, D. C.
*Rutledge, B., Lock Box 45, Florence, S. C.

Sanger, R. M., 34 Harrison st., East Orange, N. J.
*Sarrazin, J. J., Godchaux bldg., New Orleans, La.
Savage, G. E., 14 Knowles bldg., Worcester, Mass.
Schamberg, Morris I., 57 W. 58th st., New York, N. Y.
*Scherer, W. H., Houston, Texas.
Schlegel, G. S., 147 N. 8th st., Reading, Pa.
Schmidt, J. A., 1195 Dean st., Brooklyn, N. Y.
Schuhmann, Henry H., 1312 Columbus Memorial bldg., Chicago, Ill.
Searles, C. S., 100 State st., Chicago, Ill.
Seip, Howard S., 721 Walnut st., Allentown, Pa.
Semans, H. M., 106 E. Broad st., Columbus, Ohio.
Sharp, G. C., Pasadena, Cal.
Sharp, Jas. G., 3049 Washington st., San Francisco, Cal.
*Sharp, S. P., Deaderick bldg., Knoxville, Tenn.
Sharp, W. F., Union Square bldg., San Francisco, Cal.
Shaw, F. I., 1000 Cobb bldg., Seattle, Wash.
Shields, Nelson T., 61 W. 56th st., New York, N. Y.
Shorey, E. A., Masonic Temple, Dover, N. H.
Shryock, Wm. W., 129 W. Berry st., Ft. Wayne, Ind.
Shuman, Harry B., 131 Newbury st., Boston, Mass.
Sibley, W. E., 218 Bradbury bldg., Los Angeles, Cal.
Siefkin, C. Wesley, Rolfe, Iowa.
*Simmons, J. J., Kirbyville, Tex.
Simpson, O. H., Dodge City, Iowa.
*Simpson, R. L., 1 S. Third st., Richmond, Va.
*Slater, W. K., Empire bldg., Knoxville, Tenn.
Smedley, V. C., 604 California bldg., Denver, Colo.
Smedley, Wm., 604 California bldg., Denver, Colo.
Smedley, W. P., 604 California bldg., Denver, Colo.
*Smith, B. Holly, 1007 Madison ave, Baltimore, Md.
*Smith, C. L., Pensacola, Fla.
Smith, D. D., 1629 Walnut st., Philadelphia, Pa.
Smith, Eugene H., 283 Dartmouth st., Boston, Mass.
Smith, G. Marshall, 1009 Madison ave., Baltimore, Md.
Smith, H. A., 116 Garfield Place, Cincinnati, Ohio.
Smith, H. T., 116 Garfield Place, Cincinnati, Ohio.
Smith, J. Allen, 232 N. Tryon st., Colorado Springs, Colo.
*Smith, J. M., Houston, Miss.
*Smith, Julian, Austin, Texas.
Smith, Karl C., 34 E. 53d st., New York, N. Y.
*Smith, L. A., Port Gibson, Miss.
Smith, M. C., 3 Lee Hall, Lynn, Mass.
Smith, O. L., Fort Collins, Colo.
Smith, R. R., 608 26th st., Denver, Colo.
Smith, W. T., Geneva, Neb.
Smith, W. W., 63 East ave., Rochester, N. Y.
Solecki, J. H., 715 Kansas ave., Topeka, Kans.
Southwell, Chas. C., 409 Goldsmith bldg., Milwaukee, Wis.
Spies, W. F., 9 Clarendon Place, Pittsburg, Pa.
*Spurgeon, J. S., Hillsboro, N. C.

Stanley, Ned A., 3 Pleasant st., New Bedford, Mass.
Stansberry, C. J., 214 Northern Bank, Seattle, Wash.
Stanwood, H. D., Alamosa, Colo.
*Staples, G. W., Dallas, Texas.
Starr, A. R., 10 E. 92d st., New York, N. Y.
Starkweather, C. S., Bellaire, Ohio.
Steeves, Alice M., 355 Boylston st., Boston, Mass.
Stellwagen, Thos. C., 1119 Spruce st., Philadelphia, Pa.
Stephan, Jno. F., 1016 New England bldg., Cleveland, Ohio.
Stern, David, 108 Garfield Place, Cincinnati, Ohio.
*Stewart, H. T., Memphis Trust bldg., Memphis, Tenn.
*Stiff, F. W., 600 E. Grace st., Richmond, Va.
Sting, E. H., Tiffin, Ohio.
Stockton, C. S., 22 Central ave., Newark, N. J.
*Storey, J. E., Beaumont, Texas.
Straight, M. B., 80 W. Huron st., Buffalo, N. Y.
Strang, C. W., Sanford bldg., Bridgeport, Conn.
Stutenroth, C. E., Room 6, Anderson block, Redfield, S. D.
Suggett, A. H., Butler bldg., San Francisco, Cal.
Sullivan, H. H., 420 Altman bldg., Kansas City, Mo.
Summa, Richard, 410 Metropolitan bldg., St. Louis, Mo.
Sweeney, E. S., Osakis, Minn.
Swift, A. L., 140 W. 57th st., New York, N. Y.
Swift, Thos. C., 1 Park ave., Mt. Vernon, N. Y.
Swing, R. H. D., 1623 Walnut st., Philadelphia, Pa.

*Talbot, W. O., Fort Worth, Texas.
Talbott, R. W., 1410 "H" st., N. W., Washington, D. C.
*Taylor, C. H., 52 N. 2d st., Memphis, Tenn.
Taylor, F. E., Malone, N. Y.
Taylor, F. T., 419 Boylston st., Boston.
Taylor, L. C., 68 Pratt st., Hartford, Conn.
Thatcher, C. A., 30 Center st., Ashtabula, Ohio.
*Thielen, B. F., Paris, Texas.
Thomas, E. A., Red Cloud, Neb.
Thomas, J. D., 1126 Spruce st., Philadelphia, Pa.
Thompson, C. N., 3017 Michigan ave., Chicago, Ill.
Thompson, H. C., 1113 Pennsylvania ave., Washington, D. C.
*Thompson, J. W., Humboldt, Tenn.
Thomson, G. K., Halifax, Nova Scotia.
Thorpe, Burton Lee, 3605 Lindell Boulevard, St. Louis, Mo.
Tibbetts, T. E., Rockland, Maine.
*Tignor, G. S., Century bldg., Atlanta, Ga.
Tileston, H. B., 314 Equitable bldg., Louisville, Ky.
*Tison, G. B., Gainsville, Fla.
Topliff, C. L., Decorah, Iowa.
*Towner, J. D., Memphis Trust bldg., Memphis, Tenn.
Townsend, A. F., 11 Pleasant st., Worcester, Mass.
Tracy, M. C., 46 W. 51st st., New York, N. Y.
Tracy, W. D., 46 W. 51st st., New York, N. Y.
Trueman, W. H., 900 Spruce st., Philadelphia, Pa.
*Tucker, E. J., Roxboro, N. C.
Turner, C. R., 1500 Locust st., Philadelphia, Pa.
*Turner, M. E., 719 Grant bldg., Atlanta, Ga.
Turner, T. E., 606 Chemical bldg., St. Louis, Mo.
*Tuttle, M. H., Montgomery, Ala.

Van Buskirk, W. L., 202 Traders' Nat'l Bank bldg., Scranton, Pa.
*Vann, G. S., Gadsden, Ala.
*Vann, N. N., Attala, Ala.
Van Stratum, F. G., Hurley, Wis.
Van Vleck, Chas. K., 536 Warren st., Hudson, N. Y.
Varley, E. W., Pueblo, Colo.
Vaughan, E. K., Denver, Colo.
*Vignes, C. V., Macheca bldg., New Orleans, La.

Waddell, J. H., 205 Mack bldg., Denver, Colo.
Waddell, R. W., U. S. Army Dental Corps, Ft. Slocum, N. Y.
*Wahl, J. P., New Orleans, La.
Walker, A. J., 33 Main st., Bridgeton, Me.
*Walker, H. W., Macon, Ga.
*Walker, J. L., 505 Taylor bldg., Norfolk, Va.

*Walker, R. H., 231 Main st., Norfolk, Va.
*Walker, W. E., 157 Baronne st., New Orleans, La.
Walker, W. W., 58 N. 50th st., New York, N. Y.
Ward, Marcus L., 703 University ave., Ann Arbor, Mich.
Warner, E. R., 401 California bldg., Denver, Colo.
Warner, G. R., 417 N. 7th st., Grand Junction, Colo.
Warren, E. F., Central City, Colo.
Warren, Horace, Missouri Valley, Iowa.
Waters, T. S., 756 Eutaw st., Baltimore, Md.
*Watkins, J. C., Winston, N. C.
Watkins, S. E., Wilson Co. Bank bldg., Lebanon, Tenn.
Watson, A. C., 24 Masonic Temple, Denver, Colo.
Watson, C. L., Mexia, Texas.
Weaver, A. Marshall, 726 Rose bldg., Cleveland, Ohio.
Weber, A. G., 1 Corales, Havana, Cuba.
Webster, F. S., Carthage, Mo.
Wedelstaedt, E. K., 204 New York Life bldg., St. Paul, Minn.
*Weichselbaum, Wm., Savannah, Ga.
*Welch, F. J., Pensacola, Fla.
Welch, G. B., 1420 New York ave., N. W., Washington, D. C.
Welch, J. D., New Hampton, Iowa.
*Wells, W. D., Macon, Ga.
Wendell, W. C., 708 Goldsmith bldg., Milwaukee, Wis.
West, G. N., 100 State st., Chicago, Ill.
*Westmoreland, W. W., Columbus, Miss.
Wheeler, Herbert L., 12 W. 46th st., New York, N. Y.
*Wheeler, J. H., Greensboro, Ala.
Wherry, A. C., Salt Lake City, Utah.
Wherry, S. W., Ogden, Utah.
White, Edward P., 1654 Massachusetts ave., Cambridge, Mass.
White, F. D., 804 Masonic Temple, Minneapolis, Minn.
White, Gordon, 610½ Church st., Nashville, Tenn.
White, Paul G., 419 Boylston st., Boston, Mass.
White, W. A., Phelps, N. Y.
Whitmore, Y. E., 23-25 Mann bldg., Little Rock, Ark.
Whitney, A. L., 623 Commonwealth bldg., Denver, Colo.
Whitslar, W. H., 700 Schofield bldg., Cleveland, Ohio.
Wilkinson, G. A., La Veta, Colo.
Williams, G. T., 1100 Cobb bldg., Seattle, Wash.
Williams, J. T., 2900 Lake Place, Denver, Colo.
*Williamson, N. A., Prince st., Knoxville, Tenn.
Wilson, C. S., Lamar, Colo.
*Wilson, F. C., 114½ Jones st., Savannah, Ga.
Wilson, Geo. H., 701 Schofield bldg., Cleveland, Ohio.
Wilson, G. Y., Colorado Springs, Colo.
Winn, J. W., 217½ Fifth ave., Nashville, Tenn.
Wold, W. W., Jackson, Minn.
*Womack, C. T., Box 234, Martinsville, Va.
Womachke, E. A., 428 Clarke ave., S. W., Cleveland, Ohio.
Woodbury, Frank, 192 Pleasant st., Halifax, Nova Scotia.
Woodward, Marion L., 2 Commonwealth ave., Boston, Mass.
Work, C. M., Ottumwa, Iowa.
Wright, C. D., 57 W. 50th st., New York, N. Y.
*Wright, P. H., Oxford, Miss.
*Wright, T. B., Hattiesburg, Miss.
*Wright, W. R., Century bldg., Jackson, Miss.
*Wyatt, T. M., Bentonville, Ark.

Young, D. H., Attica, N. Y.
Young, J. Lowe, 571 Fifth ave., New York, N. Y.
Young, L. A., 4633 Maryland ave., St. Louis, Mo.

*Zirkle, W. M., English-American bldg., Atlanta, Ga.

PERMANENT MEMBERS WITHOUT DUES.

The following members are "permanent without payment of dues," under Standing Resolution No. 10, by virtue of having been in reputable practice for a period of fifty years:

Chase, Emma Eames, 3334 Washington ave., St. Louis, Mo.

Field, Geo. L., 4 Adams ave., W., Detroit, Mich.

Holmes, E. S., 8 New Aldrich bldg., Grand Rapids, Mich.

How, W. Storer, 1431 Mt. Vernon st., Philadelphia, Pa.

Lyman, A. E., Melbourne, Fla.

Palmer, Corydon, Warren, Ohio.

Rich, John B., New York, N. Y.

Truman, Jas., 4505 Chester ave., Philadelphia, Pa.

Turner, V. E., Raleigh, N. C.

Surviving Charter Members of the Southern Dental Association.

The following surviving charter members of the Southern Dental Association are also "permanent members without dues":

Augspath, Louis, Little Rock, Ark.

Carpenter, L. D., Atlanta, Ga.

Cole, W. T., Newman, Ga.

Cooke, W. H., Denton, Texas.

Friedrichs, G. J., 641 St. Charles ave., New Orleans, La.

Gorgas, F. J. S., 259 N. Entaw st., Baltimore, Md.

Lowrance, H. A., Athens, Ga.

Marshall, E. B., Rome, Ga.

McDonald, R. H., Griffin, Ga.

Rambo, Samuel, Montgomery, Ala.

PRESENTED TO THE COLLEGE O
DENTAL AND ORAL SURGERY
NEW YORK BY THE DEAN
WILLIAM CARR, M.D. D.D.S.

PAST PRESIDING OFFICERS.

I. PRIOR TO CONSOLIDATION.

Ex-Presidents American Dental Association.

1859. *W. W. Allport, Chicago, Ill.
First meeting, for organization.
1860. *W. H. Atkinson, Cleveland, Ohio.
1861. (No meeting.)
1862. *George Watt, Xenia, Ohio.
1863. *W. H. Allen, New York, N. Y.
1864. *J. H. McQuillen, Philadelphia, Pa.
1865. *C. W. Spalding, St. Louis, Mo.
1866. *C. P. Fitch, New York, N. Y.
1867. *A. Lawrence, Lowell, Mass.
1868. *Jonathan Taft, Cincinnati, Ohio.
1869. *Homer Judd, St. Louis, Mo.
Owing to a change in the constitution, officers elected at this and the sessions following served at the annual meeting subsequent to their election.
1870. *W. H. Morgan, Nashville, Tenn.
1871. *Geo. H. Cushing, Chicago, Ill.
1872. *P. G. C. Hunt, Indianapolis, Ind.
1873. *T. L. Buckingham, Philadelphia, Pa.
1874. *M. S. Dean, Chicago, Ill.
1875. *A. L. Northrop, New York, N. Y.
1876. *Geo. W. Keeley, Oxford, Ohio.
1877. *F. H. Rehwinkel, Chillicothe, Ohio.
1878. *H. J. McKellops, St. Louis, Mo.
1879. *L. D. Shepard, Boston, Mass.
1880. *C. N. Peirce, Philadelphia, Pa.
1881. H. A. Smith, Cincinnati, Ohio.
1882. *W. H. Goddard, Louisville, Ky.
1883. E. T. Darby, Philadelphia, Pa.
1884. J. N. Crouse, Chicago, Ill.
1885. *W. C. Barrett, Buffalo, N. Y.
1886. *W. W. Allport, Chicago, Ill.
1887. *Frank Abbott, New York, N. Y.
1888. C. R. Butler, Cleveland, Ohio.
1889. M. W. Foster, Baltimore, Md.
1890. *A. W. Harlan, Chicago, Ill.
1891. W. W. Walker, New York, N. Y.
1892. J. D. Patterson, Kansas City, Mo.
1893. (Formal session only, owing to the holding of the World's Columbian Dental Congress; officers elected in 1892 holding over until 1894.)
1894. *J. Y. Crawford, Nashville, Tenn.
1895. *J. Y. Crawford, Nashville, Tenn.
1896. James Truman, Philadelphia, Pa.

Ex-Presidents Southern Dental Association.

1869. *W. T. Arrington, Memphis, Tenn.
First meeting for organization; Jas. S. Knapp being chairman *pro tem.*
1870. *W. T. Arrington, Memphis, Tenn.
1871. *Jas. S. Knapp, New Orleans, La.
1872. *F. Y. Clark, Savannah, Ga.
1873. *H. M. Grant, Abingdon, Va.
1874. *Robert Arthur, Baltimore, Md.
1875. *J. R. Walker, New Orleans, La.
1876. *W. T. Arrington, Memphis, Tenn.
1877. *W. G. Redmund, Louisville, Ky.
1878. S. J. Cobb, Nashville, Tenn.
1879. F. J. S. Gorgas, Baltimore, Md.
1880. *J. B. Patrick, Charleston, S. C.
1881. V. E. Turner, Raleigh, N. C.
1882. E. S. Chisholm, Atlanta, Ga.
1883. L. D. Carpenter, Atlanta, Ga.
1884. *H. J. McKellops, St. Louis, Mo.
1885. *A. O. Rawls, Lexington, Ky.
1886. *W. C. Wardlaw, Augusta, Ga.
1887. *W. W. H. Thackston, Farmville, Va.
1888. *B. H. Catching, Atlanta, Ga.
1889. *J. Y. Crawford, Nashville, Tenn.
1890. *John C. Storey, Dallas, Tex.
1891. G. F. S. Wright, Georgetown, S. C.
1892. Gordon White, Nashville, Tenn.
1893. B. Holly Smith, Baltimore, Md.
1894. (Same officers held over.)
1895. *H. E. Beach, Clarksville, Tenn.
1896. John S. Thompson, Atlanta, Ga.
1897. W. H. Richards, Knoxville, Tenn.

* Deceased.

II. SINCE CONSOLIDATION.

Ex-Presidents National Dental Association.

1897. *Thomas Fillebrown, Boston, Mass.
1898. Harvey J. Burkhart, Batavia, N. Y.
1899. B. Holly Smith, Baltimore, Md.
1900. G. V. Black, Chicago, Ill.
1901. J. A. Libbey, Pittsburg, Pa.
1902. L. G. Noel, Nashville, Tenn.
1903. *C. C. Chittenden, Milwaukee, Wis.
1904. Waldo E. Boardman, Boston, Mass.
1905. M. F. Finley, Washington, D. C.
1906. A. H. Peck, Chicago, Ill.
1907. William Carr, New York, N. Y.
1908. V. E. Turner, Raleigh, N. C.
1909. Burton Lee Thorpe, St. Louis, Mo.

* Deceased.

Constitution of the National Dental Association.

PREAMBLE.

We, the members of the American Dental Association and of the Southern Dental Association, do declare ourselves a Society to cultivate the Science of Dentistry, and have adopted the following Constitution and Rules of Order for our government:

CONSTITUTION.

(Adopted at Old Point Comfort, August 5, 1897. Revised and amended at Asheville, N. C., August 1903.)

ARTICLE I.

NAME.

This organization shall be known by the name of the National Dental Association.

ARTICLE II.

OBJECT.

The object of this Association shall be to cultivate the science and art of dentistry and all its collateral branches, to elevate and sustain the professional character of dentists, to promote among them a mutual improvement, social intercourse and good feeling, and collectively to represent and have cognizance of the common interests of the dental profession.

ARTICLE III.

MEMBERS TO BE OF THREE CLASSES.

Section 1. The members of this Association shall be of three classes, viz, permanent, delegate, and honorary members; the two former classes having equal rights and privileges, except that none but permanent members shall be eligible to office.

PERMANENT MEMBERS.

Sec. 2. Permanent members shall consist of those who, coming as delegates and complying with the requirements of the Association, shall sign a statement in a book to be kept for that purpose, signifying to the Treasurer a desire for permanent membership.

DELEGATE MEMBERS.

Sec. 3. All members shall be practitioners of dentistry. They shall be received only from permanently organized state dental societies. They shall be elected by ballot at some regular meeting of their society, and shall be members who have done some meritorious work for the profession; but no person shall be received as a delegate who is in arrears for dues to this Association.

Sec. 4. Honorary members shall consist of prominent, worthy members of the dental profession, residing in foreign countries, who shall be elected by ballot.

Sec. 5. It is hereby specially provided that all persons at present permanent members of the American Dental Association and of the Southern Dental Association are permanent members of this Association, and entitled to all the privileges of the class to which they belong, without further action, and the Treasurer is hereby directed to transcribe their names upon the roll of membership of this Association.

ARTICLE IV.

DELEGATES FROM STATE SOCIETIES.

Section 1. That delegates may be received from any state society, district society, or local society affiliated with the state society, upon the certificate of the president and secretary of the state society, and that these

delegates may become members by sending their certificate together with the fee to the Treasurer of the National Dental Association.

SEC. 2. Each delegate shall present credentials which shall be approved by the Executive Committee.

SEC. 3. If the Committee on Credentials has knowledge that any applicants for membership are violating the Code of Ethics, said applicants shall not be received, but shall be referred by the committee to the societies whose delegates they are, and in no case shall this Association be compelled to treat with violations of the Code except the violator is a member of this body and has no membership in any local body.

SEC. 4. This Association will receive no delegates who, since August 1875, shall have entered the profession without having first graduated at some reputable dental or medical college.

ARTICLE V.

SIGNING CONSTITUTION.

SECTION 1. Each new member, before voting or speaking on any subject before the meeting, shall sign this Constitution, inscribing his name and the title of the society from which he receives his appointment. It is expressly agreed by each member in signing this Constitution that he will accept the discipline of a two-thirds vote of this Association.

DUES.

SEC. 2. The annual dues in this Association shall be five dollars.

DUES TO BE PAID.

SEC. 3. No member is eligible to office, nor can he speak or vote in this Association, in any of its sections, or in any of its branches, until his annual dues are paid.

DUES—IF UNPAID.

SEC. 4. If the dues of any member remain unpaid for two years his name shall be erased from the list of members of this Association.

CONDUCT OF MEMBERS.

SEC. 5. Any act of special immorality or unprofessional conduct committed by a member of this Association shall be referred to the Executive Committee, whose duty it shall be to thoroughly examine into the case, and if the charges be sustained, to report to the Executive Council during the annual session at which the charges are preferred. Whereupon by a vote of the Council the offending member may be reprimanded or expelled, a two-thirds vote being required for expulsion, a majority being sufficient for reprimand.

EXPELLED MEMBERS.

SEC. 6. Any member of this Association being expelled or suspended from his local society, shall from that date cease to be a member of this body.

RESIGNATION OF MEMBERS.

SEC. 7. Any member not in arrears may offer his resignation, upon the acceptance of which by the Council his membership shall cease; but the Council may at any time thereafter reinstate such member by unanimous consent. In case a member is dropped for non-payment of dues, two years' dues must be paid before reinstatement; nor shall he represent his society as a delegate until the two years' back dues are paid.

ARTICLE VI.

OFFICERS.

SECTION 1. The officers of this Association shall be a President, three Vice-presidents, Corresponding Secretary, Recording Secretary, Treasurer, an Executive Committee consisting of nine members, an Executive Council consisting of the President, Secretary, and five members, three Chairmen and three Secretaries of Sections, to be elected as hereinafter provided.

SEC. 2. Each officer, except as otherwise provided, shall hold his appointment for one year, or until another is elected and qualified to succeed him.

SEC. 3. The President shall be chosen from the division in which the next annual session is to be held, and one of the Vice-presidents shall be chosen from each division. (See Article XII.)

SEC. 4. At the first election three members of the Executive Committee shall be elected from each division of the country, who shall hold office for one, two, and three years, respectively; afterward but one mem-

ber shall be elected each year from each division, and hold office for three years.

SEC. 5. One member of the Council shall be elected each year from the division in which the newly elected President resides, and two members from each of the others.

SEC. 6. At the first election after this amendment goes into effect, one Chairman and one senior and one junior Past Chairman for each section shall be elected. Thereafter one Chairman and one Secretary of Sections shall be elected each year from each division, and each Chairman of Sections shall be known as Junior Past Chairman for the first year and as Senior Past Chairman for the second year after the expiration of his time as Chairman.

SEC. 7. The names of places for holding the next annual session and the candidates for office shall be nominated by informal ballot of the Association. The three names that are highest, or in case of tie, four names having the greatest number of votes, shall be the sole nominees. A formal ballot shall then be taken in which a majority of the ballots cast shall be necessary to a choice. If a choice be not made on the second formal ballot the name of the candidate receiving the fewest votes shall be dropped on the third formal ballot. The informal ballot may be made a formal ballot by a three-fourths vote of the Association. Provided that for the re-election of Recording Secretary, Corresponding Secretary, Treasurer, and Secretaries of Sections a motion, seconded, that the Recording Secretary, or Treasurer, shall cast the ballot, shall be entertained, but if this fails to carry, nominations shall be made as hereinbefore specified.

ARTICLE VII—DUTIES OF OFFICERS.

DUTIES OF PRESIDENT.

SECTION 1. The President shall preside according to parliamentary usage as laid down in "Robert's Rules of Order" and the Rules of Order adopted by this Association, and shall present an annual address.

DUTIES OF VICE-PRESIDENT.

SEC. 2. In the absence of the President, one of the Vice-presidents shall perform the duties of the office, and in absence of these officers a Chairman *pro tem.* shall be appointed by the Executive Council.

DUTIES OF CORRESPONDING SECRETARY.

SEC. 3. The Corresponding Secretary shall attend to the correspondence of the Association with other scientific bodies, when desirable, and with the societies represented in this Association. It shall be his duty to obtain information of and report annually to the Executive Council, and with its approval to this Association, an account of the meetings held, the numbers of the membership and attendance, subjects discussed in papers, essays, or otherwise, by the societies represented in this Association, and such other matters of interest as it may be well to incorporate in the proceedings of this body.

DUTIES OF RECORDING SECRETARY.

SEC. 4. The Recording Secretary shall keep accurate minutes of the proceedings of the Association, preserve the archives and unpublished documents, and attend to the other duties that pertain to his office. He shall be *ex officio* Chairman of the Publication Committee, and shall see that due notice is given of the time and place of the annual sessions of the Association. He shall be secretary of the Program Committee, and see to the preparation and printing for this committee and its distribution to the members of all societies represented in this Association, and shall provide each newly elected official with a correct copy of this Constitution.

DUTIES OF TREASURER.

SEC. 5. The Treasurer shall hold all the moneys belonging to the Association and shall keep an accurate account as between the Association and its members. He shall furnish bonds satisfactory to the Executive Committee. He shall attend the session of the Executive Committee at 9 A.M. on the first day of the annual session to receive dues, and shall attend at roll call to verify the lists of names upon payment of dues within the legal limits, and shall notify all whose names may be erased from the list of membership. He shall pay the drafts of the Secretary, countersigned by the President, and shall report to the Executive Committee, where his accounts shall be audited and by

whom his report shall be presented to the Executive Council, together with their own.

SEC. 6. All resolutions appropriating money, except for the legitimate expense of this Association, shall require a two-thirds vote of all the members of the Association present at a general session of an annual session.

ARTICLE VIII.

EXECUTIVE COMMITTEE.

SECTION 1. The Executive Committee shall be the business committee *ad interim* of the Association. They shall report to the Executive Council at each annual session, under the proper head, their doings for the current year.

SUBDIVISION OF THE EXECUTIVE COMMITTEE.

SEC. 2. The Executive Committee shall meet after the election of new members to choose their own chairman and secretary, and to divide themselves into three sub-committees as follows, and for the purpose described:

FIRST DIVISION OF THE EXECUTIVE COMMITTEE.

SEC. 3. The first division of the Executive Committee shall include its chairman. It shall act as the Committee of Arrangements, and shall make suitable preparations for the meetings of the Association, consulting with the Program Committee as to its needs. It shall report to the Executive Council at its first meeting of the annual session and with its approval see to the carrying out of the arrangements during the annual session. It shall provide a book for the registration of members or visitors as they arrive; and it shall be their further duty to secure from the Treasurer a good and sufficient bond.

SECOND DIVISION—CREDENTIALS AND AUDITING COMMITTEE.

SEC. 4. The second division of the Executive Committee shall act as a committee on registration, and shall meet for that purpose at 8 A.M on the first day of the annual session. They shall examine and verify the qualifications of members, including all violations of the Code of Ethics and the Constitution. They shall register the names of members or visitors as they arrive, with place of their residence and hotel address, and give them all necessary information regarding the arrangements for the meetings, the literary program and arrangements for entertainment, if any. They shall also act as the auditing committee for the year.

THIRD DIVISION—COMMITTEE ON VOLUNTEER ESSAYS.

SEC. 5. It shall be the duty of the third division to examine all essays, papers, or reports that may be referred to it by the Executive Council before presentation to the Association, and to report to the Executive Council their approval or disapproval of such essays, papers, or reports in whole or in any particular parts, to the end that the time of the Association may not be occupied by the reading of irrelevant, unimportant, or improper matter.

REPORTS OF SUB-COMMITTEES.

SEC. 6. Each of these Sub-committees shall report from time to time, as may be necessary, to the Executive Committee as a whole, who shall decide upon such report, if possible; but in case of their inability to decide upon any matter, it shall be brought before the Executive Council for its decision.

MEETINGS OF EXECUTIVE COMMITTEE.

SEC. 7. The Executive Committee shall, if possible, meet for consultation and arrangement of their respective duties on the day preceding the annual session of the Association. The Chairman may at his discretion summon the members thereof to a meeting for consultation or making reports, at any suitable hour during the annual session of the Association, and at any other time at the request of five members of the committee.

ARTICLE IX.

EXECUTIVE COUNCIL.

SECTION 1. The Executive Council shall be the business head of the Association during its annual session, and when it deems it necessary have charge of all its business matters whatever, and it will be its duty to take cognizance of the doings of any and all of its officers, see to the smooth working of all of its parts, and attend to all matters referred to it.

SEC. 2. The Executive Council shall meet at nine o'clock on the day of the first meeting of each annual session, to receive reports of committees, and afterward by adjournment or at the call of the presiding officers and committees, for the transaction of other business of the Association.

SEC. 3. All matters not otherwise specially provided for shall be referred to the Executive Council without debate.

SEC. 4. The Executive Council shall report to the Association at each general session the results of their proceedings for ratification or rejection without debate.

SEC. 5. The President and Secretary of this Association shall hold the same positions in the Executive Council as in the Association.

SEC. 6. Five members of the Council shall constitute a quorum for the transaction of business.

SEC. 7. All meetings of the Council shall be public; the time and place for which shall be posted for information of the members. Members may be heard on any matter before the Council.

ARTICLE X.

LOCAL COMMITTEE OF ARRANGEMENTS.

SECTION 1. There shall be appointed by the President, annually, a committee of three, residing at or near the place selected for the next meeting, whose duty it shall be to assist the Executive Committee to procure rooms for meetings, and make such other local arrangements as may be needed for the Association.

VACANCIES.

SEC. 2. In case vacancies occur in the Committees or Officers of this Association by reason of absence from the annual session or otherwise, such vacancies shall be filled by appointment *pro tem.* by the President.

PUBLICATION COMMITTEE—HOW APPOINTED.

SEC. 3. The President shall appoint two members of this Association who shall act in conjunction with the Recording Secretary as the Publication Committee. The Committee shall be authorized to employ a sufficient number of competent reporters to furnish an accurate report of the proceedings of each meeting of sections and of each general session.

ARTICLE XI.

INSTRUCTIONS TO THE PUBLICATION COMMITTEE.

SECTION 1. The Publication Committee shall superintend the publication and distribution of such portions of the transactions as the Executive Council may direct, or the Committee judge to be of sufficient value.

They shall specify in the annual report of this Committee the character and cost of the publications of the Association during the year, to whom they are distributed, and the number of copies still on hand.

SEC. 2. Any report or other paper to be entitled to publication in the volume of Transactions for the year in which it shall be presented to the Association, must be placed in the hands of the Publication Committee in typewritten form within twenty days after the close of the annual session; and must also be so prepared that the proof-sheets furnished the authors shall be returned to the Committee without material alteration or addition.

SEC. 3. Every paper received and accepted by this Association, and all plates or other means of illustration, shall be considered the property of the Association, so far as may be necessary for publication in the Transactions of this body.

DISCLAIMER.

SEC. 4. The Publication Committee is hereby instructed to print at the beginning of each volume of the Transactions the following disclaimer, viz: "The National Dental Association, although formally accepting and publishing the reports of the various sections, and the essays read before the Association, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when otherwise decided by special resolution."

ARTICLE XII.

SECTION 1. For the purpose of this Association, the United States shall be divided into three divisions, to be called the East, the South, and the West.

The East shall include New England, New York, New Jersey, Pennsylvania, Ohio, In-

diana, lower peninsula of Michigan, and Ontario.

The South shall include Delaware, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, West Virginia, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas, Kentucky, Tennessee, Arkansas, Oklahoma, and Indian Territory.

The West shall include Illinois, Missouri, Wisconsin, upper peninsula of Michigan, Minnesota, Iowa, North Dakota, South Dakota, Nebraska, Kansas, Montana, Wyoming, Colorado, Idaho, Utah, Washington, Oregon, Nevada, California, Arizona, New Mexico, and Alaska.

PLACE OF MEETING.

SEC. 2. The place of holding the next annual session shall be determined each year by ballot of the Association at its annual session, in the general session of the third day, except that the place of meeting shall be in the West in 1898, in the East in 1899, and in the South in 1900, and thereafter, in the order named, meeting in each section every third year.

ARTICLE XIII.

ORGANIZATION OF SECTIONS.

SECTION 1. This Association shall be divided into three sections as follows:

The First Section shall have charge of prosthetic dentistry, crown and bridge work, orthodontia, metallurgy, chemistry, and allied subjects.

The Second Section shall have charge of operative dentistry, nomenclature, literature, dental education, and allied subjects.

The Third Section shall have charge of oral surgery, anatomy, physiology, histology, pathology, etiology, hygiene, prophylaxis, materia medica, and allied subjects.

SEC. 2. It shall be the duty of each member to identify himself with one or more of the above-named sections, and he shall inform the Recording Secretary of his choice at the time of joining the Association.

SEC. 3. The Secretary shall assign members to the sections in which they are expected to work if they shall fail to make their own choice before the close of the general session of the second day of the annual session.

SEC. 4. It shall be the duty of the Recording Secretary to keep a list of the members of the sections and to furnish copies of the same to the officers of the sections.

SEC. 5. The Chairman of each section shall preside at all of its meetings; shall exercise general supervision over its business, and shall see that the labors of his section are so conducted as to secure the best results. In the absence of the Chairman the senior or junior past Chairman shall preside. (See Article VI, Section 6.)

SEC. 6. The Secretary of each section shall keep full and accurate records of the doings of his section, shall have charge of the stenographic reports, and report the same to the Recording Secretary each day, as soon as possible after their approval by his section.

SEC. 7. For information of all members a list of the names of members of sections shall be published in the Transactions of each year.

ARTICLE XIV.

MEETINGS.

SECTION 1. The meetings of this Association shall be known as annual sessions, general sessions, and meetings of sections.

SEC. 2. The annual sessions shall begin on the first Tuesday in August of each year and continue four days.

SEC. 3. The general sessions shall be meetings of the whole membership in attendance upon the annual session, and shall be held as follows:

The first general session shall convene at 10 o'clock on the first day and shall stand adjourned at 1 P.M., unless adjourned earlier. During this session the functions appropriate to the opening of the annual session may be performed, and the annual address of the President delivered.

On the second, third, and fourth days the Association shall convene in general session at 12 o'clock, noon, and stand adjourned at thirty minutes past one, unless adjourned sooner.

SEC. 4. In the general sessions any member may introduce matters of business, if seconded, which must then be referred to the Executive Council without debate; provided, that any member opposed to such matter of business or motion, with a second, may call for a vote on such reference. A vote shall then be taken without debate, and if

decided in the negative, that shall dispose of the matter for that annual session.

SEC. 5. The general session shall receive reports from the Executive Council as the first order of business after the reading of the minutes, and shall approve or annul any matter of business or motions referred to it by the Executive Council by vote without debate.

SEC. 6. The election of officers of the Association shall be held at the general session of the third day of the annual session, and newly elected officers presiding over the general sessions shall be installed at the close of the general sessions on the fourth day, and those presiding over meetings of each section, at the close of the last meeting of the section during the annual session.

SEC. 7. At the second and fourth general session there may be presented such addresses or reports as may be determined by the Program Committee, with the approval of the Executive Council, but these shall in no case occupy more than one hour of the general session.

SEC. 8. Sections I, II, and III shall each meet in separate rooms at 2.30 o'clock on the first day of the annual session for the reading and discussion of such essays, papers, reports, or for clinics, as may be determined upon by the Program Committee, with the approval of the Executive Council. Thereafter similar meetings of each section shall be held at 9 A.M. and 2.30 P.M. each day of the annual session. Evening meetings of the sections may be held as determined by each section.

SEC. 9. No business of any kind not strictly pertaining to the proper carrying out of the literary, scientific, or clinical work of the sections shall be introduced or considered in the meetings of the sections.

ARTICLE XV.

PROGRAM COMMITTEE.

SECTION 1. The Committee on Program shall consist of the President, Secretary, the Chairmen of sections, and the two last past Chairmen of sections. It shall be the duty of this Program Committee to keep close watch over the progress of dental science and literature, and to arrange with competent persons in the profession who are members of this Association, or with persons of known ability in closely allied subjects in science not members, to prepare and read or to discuss essays, papers, contributions, or perform such clinical demonstrations as will tend to the improvement of dentistry. It shall report to the Chairman of the Executive Committee what special preparations may be needed for carrying out the program that may be arranged or contemplated.

SEC. 2. The senior past Chairman, junior past Chairman, and Chairman of each section shall, subject to the Committee, act as a Subcommittee having especial charge of the program of that section, the responsibility in this work being in the order named.

SEC. 3. The President of the Association shall be President of the Program Committee, or, when present, shall preside over meetings of a Sub-committee. The preparation of the program for the general sessions shall be under his charge. In meetings of the Program Committee, in the absence of the President, the senior past Chairman of sections present shall preside, seniority beginning with the division in which the President resides and following the order of rotation.

SEC. 4. The Recording Secretary shall act as the Secretary of the Program Committee and shall have charge of the preparation, printing, and distribution of the programs. He shall announce at each general session the arrangement of the program for the next general session; and also the program for each of the sections for the next twenty-four hours.

SEC. 5. The Program Committee shall meet for consultation regarding the next year's work as soon as possible after the election of officers, and hold such meetings thereafter on the call of the President or Secretary, as may be deemed necessary to the efficient carrying out of the work.

SEC. 6. The Program Committee shall report to the Executive Council at its first meeting on the morning of the first day of the annual session the program arranged, for approval, and thereafter shall hold such meetings as may be necessary to arrange from day to day for the smooth working of the presentation and discussion of the matter of the program in the general sessions and meetings of sections.

ARTICLE XVI.

QUORUM.

Twenty members shall constitute a quorum in this Association.

ARTICLE XVII.

SUSPENSION OF RULES—THREE-FOURTHS TO VOTE.

The regular order of business may be temporarily suspended by a three-fourths vote of all the members present, for the consideration of a specific subject, upon the completion of which the regular order shall be at once resumed.

ARTICLE XVIII.

BRANCHES.

SECTION 1. For the wider diffusion of the benefits of this Association, the members of each division may form themselves into one or more separate bodies, to be styled "Branches."

POWERS AND OBLIGATIONS.

SEC. 2. Branches shall have such powers and privileges, and be subject to such obligations, as shall be determined upon from time to time by the National Association in annual session.

SEC. 3. Each Branch shall be free to hold meetings and to govern itself as its members shall think fit, but no Branch law shall be valid which in the opinion of the National Association may contravene any fundamental law of the Association.

SEC. 4. Each Branch shall pay its own expenses, and no Branch shall be deemed for any purpose the agent of the Association, or have power to incur any obligation in its behalf.

SEC. 5. Each Branch shall furnish a copy of its proceedings, including papers and discussions, for publication with the Transactions of the National Association.

SEC. 6. Each Branch may receive delegates from societies within its division upon the same conditions as the National Association, and such delegates shall have the same standing in the National Association as though admitted directly from state societies.

DUES.

SEC. 7. The annual dues of members attending the Branches shall be paid to the Branch Treasurer. Three-fifths of the dues may be retained for the benefit of the Branch. The remaining two-fifths shall be paid over to the Treasurer of the National Association.

SEC. 8. The annual session of any Branch shall be omitted whenever the annual session of the National Association shall be held in its division.

ORDER OF BUSINESS.

FIRST DAY.

8 A.M.—Meeting of the Executive Committee.

8 A.M.—Meeting of the Program Committee.

9 A.M.—Meeting of the Executive Council.

10 A.M.—Meeting in general session.
Report of Executive Council.
Report on Program for next general session, and for each section for next 24 hours.
President's Address.

1 P.M.—Adjournment of general session, unless sooner adjourned.

2.30 P.M.—Meetings of sections for literary and scientific work.

8 P.M.—Meetings of sections for literary and scientific work.

SECOND DAY.

9 A.M.—Meetings of sections for literary and scientific work.

12 NOON—Meeting in general session.
Reading of Minutes.
Report of Executive Council.
Report on Program.
Address, or Reports.

2.30 P.M.—Meetings of sections for literary and scientific work.

8 P.M.—Meetings of sections for literary and scientific work.

THIRD DAY.

9 A.M.—Meetings of sections for literary and scientific work.

12 NOON—Meeting in general session.
Reading of Minutes.
Report of Executive Council.
Report on Program.
Selection of next place of meeting.
Election of Officers.

1.30 P.M.—Adjournment, if not adjourned earlier.

2.30 P.M.—Meetings of sections for literary and scientific work.

8 P.M.—Meetings of sections for literary and scientific work.

FOURTH DAY.

9 A.M.—Meetings of sections for literary and scientific work.

12 NOON—Meeting in general session.
Reading of Minutes.
Report of Executive Council.
Address, or Reports.
Installation of Officers.
Appointment of Committees.
Final Reading of Minutes.
Adjournment of the Annual Session.

AMENDMENTS.

The Constitution, Rules of Order and Order of Business of this Association may be altered or amended at any annual session by unanimous consent of the members present providing notice has been given in writing at a previous meeting of the annual session at which the amendment is proposed; or by a vote of two-thirds of the members present, providing notice of the alteration or amendment has been given in writing at a previous annual session.

STANDING RESOLUTIONS.

The following standing resolutions are in force at this time:

1. Resolved, That a paper presented to the Committee on Voluntary Essays, and by them considered and returned to the writer with notification that the said paper is not accepted, cannot afterward be read before the Association unless it is made the special order by resolution adopted.

2. Resolved, That this Association discountenances the giving of banquets, excursions, entertainments, etc., by local professional societies or individuals, either during or at the close of our annual meetings.

3. Resolved, That it is unprofessional to use on cards or signs anything except name, title, and address.

4. Resolved, That this Association now in session direct that sections belonging thereto shall in the future be prohibited from inviting individuals who are violating the Code of Ethics to hold clinics or to give other exhibitions before this body.

5. Resolved, That a standing committee of three be appointed, to be known as the Committee on Terminology, whose duty it shall be to prepare and submit a carefully prepared report at each annual meeting of this Association.

6. Resolved, That this Association believes the conferring of honorary degrees in dentistry to be detrimental to the profession of dentistry, and hereby expresses its disapprobation of the practice.

7. Resolved, That a committee of three be appointed by the chair to co-operate with the officers in charge of the Army Medical Museum and Library in enriching its store of dental literature and specimens, especially by appealing to dental societies and individual members of the dental profession for assistance.

8. Resolved, That the National Dental Association condemns the use of secret preparations known as "*local anesthetics*," as well as all other secret preparations.

9. Resolved, That the secretary or other officer of each society sending delegates to this Association is expected to make a general report of the work done by the society he represents during the year, giving the subjects of the papers read before them and digests of the same, and to send said report to the Secretary of this Association at least three weeks before the date of each annual meeting; the reports to be forwarded to the chairman of the section to which they belong.

10. Resolved, That any member of the dental profession who has been in reputable practice for a period of fifty years may be elected to permanent membership in the Association without payment of dues, and any member of this Association who has been in practice for a like period shall have his dues remitted thereafter by presenting the fact to the Treasurer of the Association.

11. Resolved, That lists of the ex-presidents of the American Dental Association and of the Southern Dental Association shall be published annually in the Transactions of the National Dental Association, and that all members and officers hold the same relations to the National Dental Association that they did to the former associations.

RULES OF ORDER.

1. On the arrival of the hour of meeting, the President shall take the chair, call to order, and announce that the meeting is open for business.

2. No motion or speech shall be in order until the mover or speaker shall have been recognized and assigned the floor by the chair, nor shall a motion be open for debate until seconded and stated by the chair.

3. No one shall be permitted to address the Association before giving his name and residence, which shall be distinctly announced from the chair; nor shall he speak more than twice, nor longer than fifteen minutes in all, unless by consent of the Association.

4. At the request of any member a motion shall be put in writing.

5. At the request of five members a question shall be divided or the yeas and nays ordered.

6. When a question is under debate no other motion shall be in order, except—1st, to adjourn; 2d, to lay on the table; 3d, the previous question; 4th, to postpone; 5th, to commit; 6th, to amend—and these motions shall take precedence in the order here stated.

7. The previous question and the motions to adjourn, to lay on the table, and to postpone, shall be decided without debate.

8. A motion to adjourn shall always be in order, but no member can make such a motion while another is speaking or while a vote or ballot is being taken.

9. A second amendment to the main question shall not be in order until the first is disposed of, nor shall there be an amendment of an amendment to an amendment.

10. After a motion has been seconded and stated by the chair, it shall not be withdrawn without the consent of the Association.

11. No member shall interrupt another while speaking, except to raise a point of order.

12. When called to order, a member shall sit down until the point of order is decided by the chair, or in case of appeal, by the Association. If the point of order be sustained, the member can proceed in order by the consent of the Association.

13. Every member shall vote upon a question unless excused by the Association.

14. When any motion, except to adjourn, has been rejected, it shall not be renewed without unanimous consent.

15. Any member who on a question voted in the majority may move a reconsideration of that question; but if that motion shall be lost or laid upon the table, it shall not be renewed without unanimous consent.

16. The President may vote with the members upon all questions, but having so voted, shall not give the casting vote in case of a tie.

17. Motions for filling blanks shall be put in the order in which they are moved.

18. On a division, or in voting by yeas and nays, any member may change his vote before the result is declared.

19. These rules may be suspended by unanimous consent.

Code of Ethics.

ARTICLE I.

THE DUTIES OF THE PROFESSION TO THEIR PATIENTS.

SECTION 1. The dentist should be ever ready to respond to the wants of his patrons, and should fully recognize the obligations involved in the discharge of his duties toward them. As they are in most cases unable to correctly estimate the character of his operations, his own sense of right must guarantee faithfulness in their performance. His manner should be firm, yet kind and sympathizing, so as to gain the respect and confidence of his patients, and even the simplest case committed to his care should receive that attention which is due to operations performed on living, sensitive tissue.

SEC. 2. It is not to be expected that the patient will possess a very extended or a very accurate knowledge of professional matters. The dentist should make due allowance for this, patiently explaining many things which may seem quite clear to himself, thus endeavoring to educate the public mind so that it will properly appreciate the beneficent efforts of our profession. He should encourage no false hopes by promising success when, in the nature of the case, there is uncertainty.

SEC. 3. The dentist should be temperate in all things, keeping both mind and body in the best possible health, that his patients may have the benefit of that clearness of judgment and skill which is their right.

ARTICLE II.

MAINTAINING PROFESSIONAL CHARACTER.

SECTION 1. A member of the dental profession is bound to maintain its honor, and to labor earnestly to extend its sphere of usefulness. He should avoid everything in language and conduct calculated to dishonor his profession, and should ever manifest a due respect for his brethren. The young should show special respect to their seniors; the aged, special encouragement to their juniors.

SEC. 2. It is unprofessional to resort to public advertisement, cards, handbills, posters, or signs, calling attention to peculiar styles of work, lowness of prices, special modes of operating; or to claim superiority over neighboring practitioners; to publish reports of cases or certificates in the public prints, to circulate or recommend nostrums; or to perform any other similar acts. But nothing in this section shall be so construed as to imply that it is unprofessional for dentists to announce in the public prints, or by cards, simply their names, occupation, and place of business, or in the same manner to announce their removal, absence from, or return to business, or to issue to their patients appointment cards, having a fee bill for professional services thereon.

SEC. 3. When consulted by the patient of another practitioner the dentist should guard against inquiries or hints disparaging to the family dentist or calculated to weaken the patient's confidence in him; and if the interests of the patient will not be endangered thereby, the case should be temporarily treated, and referred back to the family dentist.

SEC. 4. When general rules shall have been adopted by members of the profession practicing in the same localities in relation to fees, it is unprofessional and dishonorable to depart from those rules, except when variation of circumstances requires it. And it is ever to be regarded as unprofessional to warrant operations as an inducement to patronage.

ARTICLE III.

CONSULTATIONS.

Consultations should be promoted in difficult or protracted cases, as they give rise to

confidence, energy, and broader views in practice. In consultations that courtesy and just dealing which is the right of all should be especially observed.

ARTICLE IV.

THE RELATIVE DUTIES OF DENTISTS AND PHYSICIANS.

Dental surgery is a specialty in medical science. Physicians and dentists should both bear this in mind. The dentist is professionally limited to diseases of the dental organs and adjacent parts. With these he should be more familiar than the general practitioner is expected to be; and while he recognizes the broader knowledge of the physician in regard to diseases of the general system, the latter is under equal obligations to respect his higher attainments in his specialty.

ARTICLE V.

THE MUTUAL DUTIES OF THE PROFESSION AND THE PUBLIC.

Dentists are frequent witnesses, and at the same time the best judges, of the impositions perpetrated by quacks, and it is their duty to enlighten and warn the public in regard to them. For this and many other benefits conferred by the competent and honorable dentist, the profession is entitled to the confidence and respect of the public, who should always discriminate in favor of the true man of science and integrity against the empiric and impostor. The public has no right to tax the time and talents of the profession in examinations, prescriptions, or in any way without proper remuneration.

SOUTHERN BRANCH.

THIRTEENTH ANNUAL MEETING.

TRANSACTIONS

OF THE

SOUTHERN BRANCH

OF THE

National Dental Association

AT THE

THIRTEENTH ANNUAL MEETING

HELD AT

Houston, Texas, May 4–6, 1910.

OFFICERS.

President—J. E. Chace, Ocala, Fla.

First Vice-president—H. Clay Hassell, Tuscaloosa, Ala.

Second Vice-president—W. Wallace Westmoreland, Columbus, Miss.

Third Vice-president—Chas. Logan Gunn, Gadsden, Ala.

Treasurer—B. D. Brabson, Knoxville, Tenn.

Corresponding Secretary—W. G. Mason, Tampa, Fla.

Recording Secretary—Carroll H. Frink, Fernandina, Fla.

EXECUTIVE COMMITTEE.

V. E. Turner, *Chairman,* Raleigh, N. C.

B. Holly Smith, Baltimore, Md.

R. W. Carroll, Beaumont, Texas.

*J. P. Gray, Nashville, Tenn.

A. J. Cottrell, Knoxville, Tenn.

C. L. Alexander, Charlotte, N. C.

* Deceased

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THIRTEENTH ANNUAL MEETING

OF THE

National Dental Association—Southern Branch,

HELD AT

HOUSTON, TEXAS, MAY 4, 5, and 6, 1910.

FIRST DAY—Wednesday, May 4th.

THE thirteenth annual meeting of the Southern Branch of the National Dental Association was called to order in the auditorium of Turner Hall, Houston, Texas, May 4, 1910, at 10 o'clock A.M., by the president, Dr. J. E. Chace, Ocala, Fla.

Rev. J. L. GROSS, pastor of the First Baptist Church of Houston, invoked Divine blessings upon the deliberations of the association.

Dr. Chace then introduced Hon. J. Z. GASTON, mayor *pro tem.* of Houston, who welcomed the association on behalf of the city of Houston, as follows:

Welcome from the City of Houston.

Mr. President and members of the National Dental Association, ladies and gentlemen,—We give you this morning the right hand of fellowship. It is a happy duty that I have to perform as a representative of the city of Houston in welcoming you to our city. Hospitality is one of the greatest and most pleasing duties of man, and has been perhaps from time immemorial. We always have a kindly feeling and tender spot in our hearts for those whom we have to entertain. After our homes have been visited by friends, we have a kindlier feeling for them when they have passed beyond our gates. We have a kindly feeling for you today, and we feel that we are more blessed in having you with us than you are in being with us. Houston congratulates herself this morning on the fact of having one of the great conventions of today meet within her borders, men representing one of the noblest professions, and we welcome you here who have come from all over our

land, from where the St. Lawrence kisses the feet of the Adirondacks to southern Texas, where the Gulf Stream warms our beloved land; from the eastern Atlantic border, where the sun kisses the promised land with a morning kiss as it rises, to the Pacific coast, where on her golden course she kisses her favorite child with a summer good-night kiss as she sinks down to rest. We want you while you are here to feel that what we have is yours, and that what you have we want you to keep; everything in Houston today we give you, and we are glad to give it and ask you to accept it with our hearts full of gratitude to you for your kindness in making this city your headquarters for this convention.

We want you to see our great highway to the sea; we want you to visit our public schools, our libraries, our city hall, and make yourselves at home there with us. We want you to go down—and while it is rather a peculiar invitation to offer visitors, we would like you to go down into a sewer, the greatest and largest sewer being built or ever built in the United States. It is within two hundred feet of you. This sewer is eleven feet in diameter, so large that you can take a pleasure trip through it in an automobile. We want you to visit our great sky scrapers, not the largest nor the tallest in the land, but we are a little child yet and we will grow; we want you to stand on the tops of these buildings and view the promised land around, and, if it pleases you, we invite you to be our fellow citizens—all good things seem to be coming to Houston. While you are here we wish you a happy and royal good time. We are building a great auditorium in the city of Houston, a convention hall that will seat eight thousand people, at a cost of three hundred and fifty thousand dollars, and before you leave we want you to introduce in this convention a resolution, and to pass it unanimously, making the city of Houston your permanent convention home.

I thank you, gentlemen.

Dr. Julian Smith, Austin, president of the Texas Dental Association, welcomed the association on behalf of the state society, as follows:

Welcome from the Texas State Dental Association.

Mr. President and members of the Southern Branch of the National Dental Association,—The pleasing duty of bidding you welcome to our state on behalf of the Texas State Association has been assigned to me, and it affords me great pleasure to extend to you a most courteous and hearty welcome. I am proud, gentlemen, to be the representative on this occasion not only of the state of Texas, but also of the Texas Dental Association, because I have something to be proud of. I am proud of our state not alone on account of the extensive territory encompassed by its boundaries, not alone because we are the greatest cotton-producing state in the world, not alone because we are the largest rice-producing state in this country, not on account of the salubrity of our climate, the richness of our soil, nor the vast wealth of our mineral deposits, nor even yet because Texas rolls up the largest democratic majority, but I am proud, gentlemen, because everyone of its five million inhabitants, increasing annually at the rate of three hundred thousand, has a heart in him which extends to the stranger within our gates a hospitality which is surpassed nowhere in the world

—that is the welcome I extend to you today. The time has not long passed when Texas was the Mecca for the halt, the lame, and the blind of the dental profession, where they could wend their way and be assured of a livelihood. It was a sea of Sargosso where the flotsam and jetsam of the dental world could find a safe harborage, but thanks to the noble efforts of these gentlemen, members of the state association, that time has passed, and today a man granted a license to practice in the state of Texas is competent to practice dentistry anywhere in the world.

In your annual pilgrimages to the various cities in your territory you have no doubt met with wondrous hospitality, but, gentlemen, we propose to outdo them all in this respect and try to do even better than the Missourian demands; we propose not only to show you, but to put it right into your hands—that is the Texas way. We propose to treat you so well that our only fear is that all of you will want to locate here, and that, to say the least, would be a calamity for the rest of the country. We hope that your stay with us will be not only pleasant but profitable. Our homes as well as our hearts will be open to you, and we hope that you will find so much pleasure here that the Texas meeting of the Southern Branch will always remain one of the brightest spots in your memory.

Gentlemen, once again on behalf of the Texas Association I extend to you a most cordial and hearty welcome.

Dr. W. E. Walker, New Orleans, responded to the addresses of welcome, as follows:

Response to Addresses of Welcome.

Mr. President of the Texas Dental Association; Mr. Gaston, representative of the city of Houston,—It is to me a pleasure in a few brief words to endeavor to express as sincerely as could have been done by one who unfortunately is not with us, our appreciation of the hearty welcome extended to us today.

From Georgia came the silver-tongued orator of the South; from Tennessee came to our profession our silver-tongued orator, Dr. J. Y. Crawford, who was to fill my place today. If he were here, you would no doubt hear flights of oratory and eloquence beyond my reach, but no more sincere ones, gentlemen, than my feeble expression of the appreciation of the welcome given to us today. I think I can express to you one and all, the hope that on parting we shall leave your city as clean as we have found it.

Dr. Julian Smith, president of the Texas Dental Association, was called to the chair, and the president, Dr. J. E. Chace, Ocala, Fla., read his annual address. (See following page.)

PRESIDENT'S ADDRESS.

By J. E. CHACE.

Fellow members of the Southern Branch, ladies and gentlemen,—From the promptings of my heart, I wish to preface this address by an appreciative acknowledgment of the honor which I deem it to preside over the deliberations of a meeting of the Southern Branch of the National Dental Association. Seldom has an honor been less merited, and I say with confidence, never more keenly felt. This expression of your confidence and esteem shall always be my most cherished remembrance, and a never-ending influence in consecrating my life to the highest and best in my profession.

For the first time in its history, the Southern Branch holds its meeting west of the Mississippi and in the great state of Texas. There are those high in the councils of the branch who have for years advocated coming West, but not until last year was the sentiment strong enough to prevail. With what wisdom this decision was finally made will be determined by the character of this meeting. But if my experience with the men of Texas during the months we have been intimately associated in preparing for this meeting entitles me to an opinion, I say that should this meeting prove a memorable one in any respect, great credit is due to the organized profession of Texas, from whom the officers and committees of the branch have received only the most cordial and constant courtesy and support. My personal relationship with the officers and committees of the Texas State Dental Association and those of the Houston Dental Society have been of such a nature that I have come to believe firmly that all things are possible in Texas.

Concerning the circumstances connected with the fixing of the time for this meeting, most of you know that at the business meeting of the branch held in Birmingham in 1909, Texas was selected as the place for this meeting, the date being left to the Executive Committee. After due conference with our Texas *confrères,* the dates May 11th, 12th, and 13th were decided upon, and the announcement so made to the members.

It was then found that this date conflicted with the date of the Alabama meeting, and that their date, being fixed by their constitution and by-laws, could not be changed. The advisable thing seemed to be to change our date, and May 4th to 6th was chosen as not being in conflict with any southern state society meeting, and as being a time when weather

conditions in Houston would be most perfect. At a time when, in the opinion of your Executive Committee and president, a further change was not to be considered, it was learned that the new date was a most inconvenient one for the faculties of the various schools, and consequently we shall be deprived of the presence and counsel of many of our most active members at this meeting. This we deeply deplore. We are glad, however, to note that some of the members of college faculties have made such sacrifice as was necessary, and are with us today. To these we feel an indebtedness commensurate with their loyalty.

In looking back over the past of the Southern Branch, and comparing it with conditions existing today, we see many things which justify us in the conviction that the branch is filling a need in the life of the profession of our Southland. No feeling of sectional pride alone, no matter how loyal nor how commendable, is sufficient to maintain an organization of this kind. Its reason for existence must strike its roots deeply into the soil of the needs of the conditions and the times.

Our membership has shown a steady growth for the past ten years which culminated in the addition of over fifty new members in 1909. But no survey of conditions would be fruitful which did not show us wherein we might strengthen our organization, and thus better meet the needs of our particular section.

It is too apparent and too generally recognized to need reiteration that the one great weakness of the Southern Branch is the lack of co-ordination and of the feeling of common interest between it and the various state societies of our section. It was originally endeavored to make the branch a delegated body, each state society being allowed one delegate for every ten members, and the permanent membership of the branch being derived from those sent by the state societies as delegates.

That this was a failure is shown by the fact that it has been discontinued, both in the National and the Southern Branch. There are several reasons why the delegate system failed, but the most important reason, I think, is that no particular power or function had been delegated to the Southern Branch by the state societies. In no sense of the word can the branch legislate for them, nor can it be considered an advisory body. A delegate is a person sent or empowered to act for another, a deputy, a representative; therefore, where no power is assigned, the delegate system is illogical.

The true relationship between the branch and the state societies is that of the greater to the lesser, and the success of the branch is dependent on the need we feel for a larger organization, where the men of the various state societies may come in order to get to know each other better, and be mutually helpful in gaining greater knowledge of our profession and in advancing its interests.

In the North and East, where the population is denser, the state and tri-state meetings may be large enough; but with us of the South, our state meetings are necessarily small, and our need is a larger organization with more brains exhibited in the papers and more skill demonstrated in the clinics than one state can furnish. The state societies should and will further those interests in which their members are concerned; therefore, if each state society were requested to assist the branch by electing or appointing each year one essayist and one clinician, whose duty it would be to

present a paper and clinic at the following meeting of the branch, I believe it would meet with favorable consideration, and would afford a logical connection between the branch and the state organizations, as well as adding materially to the value of our programs.

Any review, however superficial, of the developments within our profession within the past year which did not take note of the movement for the education of the public in matters pertaining to oral hygiene would be most inadequate. To trace this movement in its various steps, to give due credit to those faithful and earnest workers who have made this a live and burning national issue, is outside the scope of this address. But your president feels that he would be remiss in his duties to you, his profession, and society in general, if he did not direct attention to the far-reaching consequences of this most important movement, and urge upon the members of this body the obligation which rests upon them. Rarely before has it come within the province of any body of men to be of greater service to mankind, and we must not forget that opportunity always carries with it responsibility, as well as privilege.

I will not say more, lest I anticipate somewhat the feast which our committee has in store for us, but I cannot let pass this opportunity of acknowledging the indebtedness we owe this committee for its untiring energy and most loyal support, and I trust that the Southern Branch will see fit to make such an appropriation toward the furtherance of this work as its importance demands and the conditions make possible.

At the coming meeting of the National Dental Association there will be considered the question of the adoption of certain changes in the constitution of that body. Your president has regarded it as his duty to go over these proposed changes with a view to the interests of the Southern Branch, and to advise you if there be anything inimical to that interest.

The *personnel* of the Committee on Revision makes it certain that if there be anything embodied in or omitted from this report which is not fair to all parties, it was an oversight. I feel that the report of this committee is a notable and conscientious effort to formulate a working plan which will increase the strength of our national body, numerically and otherwise. I favor its adoption and hope for increased prosperity and usefulness for the National under its operation. There is one minor point, however, in which the branch will suffer if the proposed revision is adopted without amendment. Under conditions as they now exist, while the branch is required to furnish a copy of its proceedings for publication with the transactions of the National, it is privileged to dispose of them otherwise as it sees fit; and for some years it has entered into an arrangement with one of the journals by which the journal has furnished a stenographic report of its meeting in exchange for the privilege of publishing its papers.

In case of the adoption of the proposed revision, we will still have to furnish a copy of our proceedings to the National, but we will not be able to exchange the privilege of publishing our papers for the stenographic report of our meetings, as the National will publish its own journal.

In dollars and cents this will mean a difference to us of the cost of the stenographic report, which will amount to about $150. Whether this can be

changed, or whether it is a matter of sufficient importance to consider, I leave to you.

It may be laid down as a truism that when a nation or an organization ceases to honor its great men, that nation or organization has already entered upon a period of decline and is doomed to speedy dissolution. That dentistry is still a great way off from a period of senility, I think it unnecessary to argue. But one of the surest indications of its vigorous health is the continued growth for the past few years of a sentiment in the profession that the feeling of love and respect which we bear toward those who have achieved distinction in our calling should be voiced while they are still with us; that we should not wait until they are gone and then lay withering tributes on their graves. Surely, no worthier sentiment was ever born of love, and if the Southern Branch were not the first, it should certainly not be the last to adopt some method of publicly and collectively honoring our prophets and sages. The method adopted by at least two other societies has been the complimentary banquet, and the success of this measure has been most notable. I believe that such a banquet given each year in honor of some distinguished American dentist should become one of our established customs.

The constitution and by-laws under which the Southern Branch is now working were adopted in St. Augustine in February 1898, over twelve years ago. Since that time there have been appointed at different meetings committees on revision, but so far as your president has been able to determine, after a careful examination of our published records, no report has ever been made by such committee. So our constitution now stands just as it was adopted. Changes have been made in the National constitution from time to time, and it is likely that at the coming meeting of the National Association in Denver further extensive changes will be made in the constitution of that body. It therefore seems imperative that some steps be taken at this meeting which will place our fundamental law in harmony with that of the parent body.

Pursuant to those of the foregoing suggestions, upon which, in the opinion of your president, some action should be taken at this meeting, I would make the following recommendations:

(1) That a committee of ten, to be known as the Committee on Complimentary Banquet, be appointed each year, whose duty it shall be to ascertain the choice of the association for this honor, to provide ways and means, and to carry into effect the necessary arrangements for a complimentary banquet to be given on the first evening of the annual meeting.

(2) That the president-elect appoint a committee of one for each state within the Southern territory, whose duty it shall be to go before his state society at its next meeting, explaining the desirability of closer relationship between the Southern Branch and the state societies, and request that in furtherance of this idea they appoint or elect one essayist and one clinician to attend the next annual meeting of the branch as their representative on the program.

(3) That a Committee on Revision of Constitution and By-laws be appointed by the president-elect of this meeting, whose duty it shall be to revise and harmonize our constitution and by-laws with

that of the National Dental Association, and to report at the next annual meeting.

In conclusion, I wish to extend thanks to those through whose efforts we have before us a program which I am sure will prove of unusual interest, and to our hosts on this occasion, the profession of Texas, whom we shall always love and never forget.

After some discussion of the recommendations in the President's address, Dr. W. G. Mason moved that the chair appoint a committee of three to consider the President's address, formulate proper resolutions in regard to the recommendations, and report to the society at a later session.

The motion was carried, and the following were appointed by the chair as such committee: Drs. W. G. Mason, C. M. McCauley, and J. P. Corley.

Dr. Chace then resumed the chair.

Dr. M. S. Merchant, Houston, Texas. *Mr. President and gentlemen,*—Among the pioneers of Texas dentistry and foremost among the men who raised dentistry to the organized standard, stands one of our *confrères* who was in 1890 elected to the presidency of the old Southern Dental Association at Galveston, and the next year, when the Southern met in Atlanta, according to the idea presented by the president in his address today of honoring men while still alive, the Southern Dental Association presented him with a beautifully mounted ivory gavel with his name engraved on it, which he used in governing that association. The son of that gentleman has preserved that gavel, and has brought it here and kindly offered to loan it to our president for this occasion. In cooperation with his friends among the dentists of the olden times, this kindly man by his influence has done a great deal to elevate the dentistry of Texas and of the South. He encouraged many young men to enter dentistry and helped the older dentists to get out of the ruts and raise dentistry to the position that it occupies at present in Texas. I refer to Dr. J. E. Storey of Dallas, Texas, whom all who knew him loved. Mr. President, for this occasion we want to loan to you and this association this gavel, and we know that we are giving it into competent hands.

Dr. Chace, in accepting the gavel, said: Gentlemen, I accept the use for this meeting of this gavel, presented by the Southern Dental Association to Dr. Storey in 1890. I regard it an honorable privilege to wield the gavel used by so distinguished a member of our profession, and trust that it will be wielded with fairness over the deliberations of this meeting.

Motion was then made and carried to adjourn until the afternoon session.

FIRST DAY—Afternoon Session.

The meeting was called to order Wednesday afternoon at 2.30 o'clock by the president, Dr. Chace.

The first order of business was the reading of the minutes of the previous session by the recording secretary, *pro tem.*, Dr. W. G. Mason, who also read the minutes of the closing session of the last annual meeting, as follows:

NATIONAL DENTAL ASSOCIATION,
SOUTHERN BRANCH,
Birmingham, April 1, 1909.

The meeting was called to order by Dr. H. C. Hassell, vice-president, with Dr. W. G. Mason as temporary secretary.

Dr. V. E. Turner moved that the present officers be continued in office for another year. Motion carried.

Dr. Turner also moved that the next meeting of the society be held in Dallas, Texas, in 1910, and that the time of the meeting be referred to the Executive Committee. Motion carried.

Dr. B. Holly Smith moved that the secretary be instructed to send a word of sympathy to the president, Dr. Chace, who was prevented from attending the meeting on account of the sickness of his wife. Motion carried.

Dr. Turner moved that the secretary be instructed to send the greetings of the society to Dr. Frank Holland. Motion carried.

Motion was made and carried to adjourn until the next annual meeting.

H. C. HASSELL, *Vice-president*,
W. G. MASON, *Sec'y pro tem.*

Motion was made and carried that the minutes be approved as read.

Dr. Julian Smith was called to the chair, and the Committee on the President's Address made the following report:

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

We beg to submit the following report:

We desire to commend the President's address as a whole, and especially the vital recommendations contained therein. The address is an able one, and represents earnest thought and endeavor on the part of our president, leading toward the improvement in conditions, increase in enthusiasm and growth of the Southern Branch, and the accomplishment of the great good which is destined to be done by this branch of the National.

We desire to congratulate this association upon the faithful, earnest, and effective work done by its president in arranging such an excellent program and securing harmony of action through the committees of the Texas State Dental Association.

We heartily concur in the sentiment expressed in regard to establishing a closer relationship between the state associations in this body, and suggest that ways and means of bringing this about be discussed at this meeting, and definite action be taken leading to that end.

We indorse the president's remarks touching upon the hygiene campaign.

We heartily indorse the ideas contained in this address pertaining to the banquet plan of honoring our worthy living co-workers. We believe in presenting the bouquets to the living rather than placing them upon the graves of the dead.

We also believe that the election of an essayist and clinician by each state association to represent that association in this body will contribute materially to our program, will stimulate our members to put forth better effort, and will also encourage more careful study and research among the members of the different state organizations.

We concur in the president's recommendation that our by-laws and constitution be so changed and amended as to harmonize with those of the National Dental Association, of which we are a component part.

In order to facilitate effective action on the part of this body in carrying out the worthy recommendations set forth in this address, we desire to offer the following resolutions: Be it

(1) RESOLVED, That this association appropriate the sum of $500 from its treasury for the purpose of financing the oral hygiene campaign. Said money to be placed in the hands of the Hygiene Committee of this association for the ensuing year, to be expended by them as they deem for the best interest of the cause of oral hygiene. We suggest that this committee be appointed immediately after the election of officers.

(2) RESOLVED, That the president appoint a committee of ten members of this association each year, to be known as Committee on Complimentary Banquet, whose duty it shall be to ascertain the choice of the association for this honor, to provide ways and means, and to carry into effect the arrangements necessary for a complimentary banquet to be given on the first evening of the annual meeting.

(3) RESOLVED, That the president appoint a committee of one for each state within the Southern Branch territory, whose duty it shall be to go before his state society at its next meeting, explaining the desirability of closer relationship between the Southern Branch and the state societies, and requesting that in furtherance of this idea they appoint or elect one essayist and one clinician to attend the next annual meeting of the branch as their representative on the program.

(4) RESOLVED, That a committee on revision of constitution and by-laws be appointed by the president, whose duty it shall be to revise and harmonize our constitution and by-laws with those of the National Dental Association, and which shall report at the next annual meeting.

W. G. MASON,
J. P. CORLEY,
C. M. MCCAULEY,
Committee.

The resolutions presented by the committee were, on motion of Dr. Mason, taken up in regular order and considered by the association.

The resolution appropriating five hundred dollars to the Oral Hygiene Committee was laid on the table until a later session.

The other resolutions embodied in the report of the Committee on the President's Address were adopted by the association.

The next order of business was the report of the Executive Committee, through the chairman *pro tem.*, Dr. C. L. ALEXANDER, which consisted of a number of applications for membership.

Dr. J. P. GRAY moved that the rules be suspended, and that the entire list of applicants be elected by one vote from the secretary.

Motion carried.

The Executive Committee announced that the Thursday morning session would be devoted to the Oral Hygiene Committee, Thursday afternoon to clinics, and the evening session to the public Oral Hygiene meeting.

The Executive Committee presented the following resolution:

RESOLVED, That a memorial service be held this afternoon at five o'clock in honor of our departed friends and co-workers, Drs. J. Y. Crawford, Nashville, Tenn.; H. R. Jewett, Atlanta, Ga.; W. G. Whitsett, Lebanon, Tenn.; D. H. McNeil, Athens, Ga., and that when we adjourn, we do so in honor of their memory.

The report of the Executive Committee was adopted.

Dr. J. A. GORMAN, New Orleans, chairman of the Committee on Orthodontia and Oral Surgery, reported a number of papers from his section, which were presented in regular order.

The first paper was one by Dr. P. A. SKEEN, Texarkana, Ark., entitled "Orthodontia," as follows:

Orthodontia.

By P. A. SKEEN.

It affords me no little pleasure to have been asked by Dr. J. A. Gorman of New Orleans, chairman of the Orthodontia Committee, to read a paper on this important occasion; important for the fact that we have never had a meeting like it, composed of the talent of a progressive, up-to-date, learned profession which has a right to feel proud of its attitude toward the public and of its station among its peers.

The practice of orthodontia fills such a vast scope that I would not have time to do otherwise in the short time allotted me than mention some points briefly. The history of orthodontia, ancient and modern, is familiar to every member of the profession. Surely orthodontia, from every viewpoint, as it is now being practiced, is a godsend to the laity, but not appreciated as it should be for want of information as to its possibilities. Our profession must maintain its dignity, but is surely handicapped by the ethical code, being barred from imparting valuable information outside the office, although the public looks to us for such information as the profession is in possession of and will give out. The public, it seems to me, need more enlightenment on orthodontia than on any other branch of our profession.

Many reasons exist for the non-appreciation of the possibilities in the practice of orthodontia. Mostly the specialist serves the younger class of patrons. I have found it difficult to get them to see and realize the importance of the ordeal, as at that age patients dislike anything that looks like a dental operation. Neither do the parents know what can be accomplished by orthodontic measures.

Another important point is proper compensation for services rendered. Parents seldom take their children with deformed mouths to the dentist as they would to the oculist, and say, "Doctor, if you can do anything for this child, do it," expecting to render adequate compensation. On the contrary, the specialist must explain, and in doing so he should mention a fee, and be sure to ask enough, for he must make good the undertaking.

It matters but little what apparatus is used, as long as it is the right one. A tooth can be moved with almost anything, a strand of grass rope, rubber bands, thin metal strips with a little spring in them, frequently even finger pressure. For various reasons I sometimes extract in order to correct malocclusions. To be successful in this specialty, one should have the elements of an artist as well as those of a dentist and mechanic. The operator, before starting the treatment of a case, should be able to draw mental photographs of how it should look after the operation, and not just "know what to do and do it."

To stay well within the range of ethical practice, it is difficult for the average dentist to do much in this specialty; notwithstanding the need of orthodontic work being done by the aver-

age dentist, it is sometimes better to refer the patient to the specialist. The possibilities of this practice are almost boundless, and when it is more fully understood and appreciated, the efficiency of dentistry will be more fully established. It is up to the ingenuity of the National Association to say just how the public shall be educated along these special lines without at the same time digressing from the established rules.

Discussion.

Dr. J. A. Gorman, New Orleans, La. I do not like to antagonize Dr. Skeen, as I did not read the paper, but I should like to make one or two remarks in regard to it. The essayist spoke of the ordeal of correcting malocclusion. I do not find it an ordeal, nor do my patients. They seem to become very much interested in the work, and it is carried along without any trouble or inconvenience.

The essayist also spoke of extraction. I see no reason for extracting excepting supernumerary teeth. If a case is properly studied, there is no excuse for extraction.

Dr. W. E. Walker, New Orleans, La. If by the word ordeal the essayist means pain, I think the practice of orthodontia as an ordeal is past, but if he means the inconvenience of wearing an apparatus, that of course is usually necessary. It is a never-to-be-desired necessity that causes some inconvenience in spite of all we can do, therefore all possible efforts should be made to prevent malocclusion. If the laity only knew the measures, and carried out the information to be obtained from the profession today, nine out of ten cases of malocclusion could be prevented. This should be done, if for no other reason, in order to avoid the inconvenience of wearing a regulating apparatus and the expense and expenditure of the patient's time, but as to orthodontic treatment being a painful ordeal, that day is passed, if such treatment is administered by competent men and with the proper apparatus.

Dr. J. L. Buchanan, Bonham, Texas. The essayist spoke of extraction in regulating. If teeth are extracted, the arch contracts and an abnormal condition is noted in and around the mouth; such conditions are more noticeable around the mouth than in any other portion of the face. The extraction of teeth allows the lips to drop in and the face loses character.

Dr. G. W. Staples, Dallas, Texas. As far as regulation of malocclusion being an ordeal is concerned, I would like to say that I believe it to be an ordeal both for the patient and for the operator. It may be possible that the days of pain have passed for the operator, but I want to make the assertion that the days of pain have not passed for the patient. I did a little experimenting in my own mouth, and if a man works for himself he is usually rather gentle. There is still a good deal of pain connected with regulating work, not so much in the movement of the teeth itself, but the patient has great difficulty in masticating such articles of food as soft-boiled eggs and milk —there are times when he cannot masticate these with any degree of comfort whatever.

As far as the extraction of teeth is concerned, I do not believe that any practitioner can say that we should not extract teeth at all. Orthodontia is the widest field in the practice of dentistry today. Never were there two cases alike, and never will there be, and it depends

entirely on the ingenuity of the individual as to what the results as well as the procedure shall be. There are cases in which, in my opinion, extraction is necessary for a satisfactory result. I do not advocate, but condemn, promiscuous extraction of teeth in regulating. Ordinarily we can correct malocclusion without it, but if one maintains that we should never extract in regulating teeth, I believe that he has either failed to meet with a case of that kind, or is adhering entirely too closely to his textbooks. Theory is good, but we can forget and do without a lot of it. It is only the theory that will work out in practice that is worth anything. I recall one case of correction in which I made a most miserable failure because I did not extract, and I have seen in my practice possibly only three cases in which I deemed it necessary to extract teeth for the correction of an irregularity, but I believe there are a good many cases in which we cannot get good results without extracting.

I wish that practitioners would really take more interest in the subject of orthodontia. It is one of the most important and one of the widest fields we have in dentistry, and yet a vast number of dentists will not encourage the parents of children to put them under their care for orthodontic treatment, because it causes a great deal of trouble, and they do not care to undertake a regulating case on that account. The possibilities of regulation are unlimited if cases are treated in time, but most dentists put off such treatment too long simply because they do not care to trouble with it. The children who are undergoing orthodontic treatment invariably present at the time when we are busiest, when they have very likely broken some part of the appliance that needs to be adjusted immediately, but which is often allowed to go for three or four days after the appliance is broken. The taking care of these cases is a serious matter and one that causes a good deal of worry, yet they can be handled in a way that is not altogether unpleasant if we approach the patient properly. It has been my experience that when the work is begun, the children enter into it enthusiastically and come regularly, but in a month or so they begin to tire, do not come regularly, and their smile is entirely gone. On the whole, the work causes a great deal of trouble and little pleasure, but I think we should do more of it and encourage the parents to pay more attention to it, for the welfare of the children of the present and the future generations.

Dr. Skeen (closing the discussion). Probably it is my fault, but unfortunately the patients who come to me for that kind of work are timid. That, however, may be a good quality; I rather believe that it is; but it is hard for me to induce a girl of fourteen to submit to any dental operation. When the patients grow a little older, they change somewhat. I know that in spite of decayed teeth, which they are perfectly aware should be treated, they are absolutely afraid of the dentist. Dental work is an ordeal to those people, and the dentist must not only talk to the child but to the parents, and he cannot very well do that outside of his office. When the children have fathers and mothers who know nothing of the possibilities of what can be done, how can they know that anything can be done that will benefit them. The ethical practitioner cannot go to a man and tell him that his child needs dental work. That would be lowering

the dignity of the profession. We have to let patients come of their own accord. If a girl has a deformity of the mouth, who is going to inform her mother or her father? Her mother does not know it, and the father does not care, because he is busy attending to business. If we could tell that mother that we could do thus and so, we could probably do some good for these unfortunate children, but we have to wait until they come to our offices, and then we can talk as we please. Another factor that we meet is that social customs interfere with the wearing of an appliance in the mouth.

As regards extraction, I do not believe any practitioner who does very much orthodontia can get along without extracting teeth occasionally. I have found teeth that could not be moved to their normal position at all, and I only claim that occasionally teeth should be extracted for the purpose of regulating. I do not do very much work of this kind, simply because not many cases present to me, but I believe the time has come when more of it should and will be done by the general practitioner. As the last speaker has said, the general practitioner generally avoids this kind of work. I do not believe that half the dentists can indicate what ought to be done. Malocclusion is frequently a deformity that they are accustomed to as well as the patient. Children sometimes lack the bicuspids, and do not know that teeth are missing unless some dentist tells them.

The next order of business was a paper by Dr. J. M. Murphy, Temple, Texas, entitled "Treatment of Fractures of the Maxillæ."

The paper here follows:

Treatment of Fractures of the Maxillæ.

By J. M. MURPHY.

In the treatment of fractures of the maxillæ, the ingenuity and resources of the operator are taxed to a greater extent than in almost any class of cases that occur in ordinary practice. The reason lies not in a lack of precedent set by the use of some particular method or appliance, nor in the lack of literature on the subject. Jaws have been broken and treated from time immemorial, and sundry appliances and methods have been used and advocated; but the operator's ingenuity is taxed in meeting and making provisions for the complications that are met with, and in constructing an effective appliance to suit a case with particular complications. The treatment of a simple fracture of the lower jaw, when all the teeth are good and in normal occlusion and a healthy mucous membrane of the mouth exists, is a very simple matter, as will be shown later. Such simple cases, however, are exceptions and of very rare occurrence.

COMPLICATIONS IN MAXILLARY FRACTURES.

Some of the complications that are met with and have to be provided for are loss of teeth, natural malocclusion—by that term is meant a malocclusion that existed before the accident—patho-

logical conditions of the mucous membrane of the mouth, compound and multiple fractures, and other traumatic conditions that result from an injury, all of which must be considered.

PRELIMINARY TREATMENT OF FRACTURES.

It is also seldom that the operator has the opportunity of seeing the case immediately after the occurrence of the accident, which of course would be the logical time to begin treatment. The fracture has usually been dressed temporarily, and more or less time has been allowed to elapse. When such has been the case, it is best not to use haste in reducing the fracture and placing appliances, as in so doing too great a risk of introducing infection is encountered. It is best to wait until the acute swelling subsides, as the loss of a few days or a week will do no harm. As a preliminary treatment, irrigation of the mouth and nose is applied with a 1 per cent. sterile solution of carbolic acid, used as hot as can be borne and introduced from a common fountain syringe, elevated to such a height as to give a stream of considerable force, this to be repeated every hour or so according to the severity and demands of the case. This treatment should be kept up constantly from the time of the accident until all retaining appliances are discarded. The retention and decomposition of secretions and particles of foodstuff in the interdental spaces and the buccal cavity should be diligently guarded against, and the above is the best means that I have ever found with which to accomplish this.

LOCATION AND CLASSIFICATION OF FRACTURES.

As for the classes of fractures, as viewed from a surgical standpoint, which one encounters in this kind of practice, you are referred to any standard work on fractures, where a more general treatment on the subject can be had. In my experience, fractures of the jaw are seldom simple, but usually compound and multiple. I have had more cases of fracture of the lower jaw that occurred on the left side than on the right. I am not prepared, however, to say that the left side is more susceptible to injury than the right. I can see no reason why it should be, but that has been my experience. I have never had a case of fracture on the right side where none existed on the left, while I have treated a number of fractures on the left where none existed on the right. The lower jaw, of course, is more susceptible than the upper, the reasons being very apparent. If I were called upon to say where fractures occur most frequently, I would say that according to my experience they occur most frequently between the symphysis and cuspid; second in frequency is the portion between the cuspid and first molar; third, the region of the third molar or the junction of the body and the ramus of the lower jaw, and fourth, the upper jaw. Hence, for the sake of convenience, I shall divide fractures into these four classes, and shall treat them as such in the matter of selecting retention appliances.

MEANS OF REDUCTION AND RETENTION.

We will now consider the matter of reduction and retention. I suppose the most ancient, as well as the crudest and most ineffective form of retention, is the bandage. The next method in regard to antiquity is probably that of wiring the teeth together. Angle says that this was practiced by Hippocrates in the fifth century B. C. Both these methods, while

antiquated and crude, nevertheless, in some cases and under some conditions, can be well used in conjunction with other appliances. The vulcanite interdental splint was one of the first contrivances that the modern dentist contributed for the relief of this class of sufferers. In Scudder on "The Treatment of Fractures" a number of styles and modifications of the interdental splint can be found. This is a mode of retention that I have never found it necessary to use. I have seen cases treated by that method, however, and have noted how difficult it is to maintain any degree of asepsis, so that I am possibly somewhat prejudiced against its use. There is a form of sub-mental splint which consists of a metal or vulcanite splint to fit the occlusal surfaces of the teeth, and fastened to a metal cap that fits the chin and jaw underneath by means of bars and nuts; this in many instances could be used to advantage. The most important step that has been taken toward the application of scientific principles in the retention of this class of fractures was taken by Dr. Edward H. Angle, who devised a system of adjustable bands, which may be adjusted to and fastened on any tooth by means of a threaded bar and nut; this band also has soldered on the same side a ball to which wire ligatures may be easily attached, and in the treatment of many cases of multiple fracture these little bands are invaluable.

LUKINS' RETENTION APPLIANCE.

The appliance that has been of greatest value to me in this work has been the band devised by Dr. C. D. Lukins, which is similar to that of Dr. Angle in its application, its principal difference being that of the threaded bar, which in the former is hollow, through which the ordinary orthodontia expansion arch bar, traction bar, and jackscrews may be passed. These bands, in conjunction with the appliances ordinarily used in orthodontia, make the most effective and compact appliance for the retention of these fractures. Their first and most salient feature is the rigidity and stability with which they hold the parts in position; second, the compactness and simplicity of the appliance, which makes it possible to maintain the greatest amount of asepsis.

PRINCIPLES FOR SELECTING AN APPLIANCE.

As I stated in the beginning, all of one's ingenuity is often taxed in devising an appliance that will most nearly eliminate all objectionable features and that can cope with the complications that are found in each particular case. Two features should ever be kept in mind in making this selection; first, the maintenance of absolute rigidity of the ends of the fracture, and second, the compactness of the appliance, this latter being very important, on account of it being easier to keep it perfectly clean.

TREATMENT OF FRACTURE BETWEEN CENTRAL AND LATERAL.

To illustrate the application of our appliances, we will take an hypothetical case of our above-mentioned first class, a compound fracture between the central and lateral, with a normal set of teeth in normal condition. I should select two Lukins clamp bands for the second bicuspid on either side, place them in position and tighten them thoroughly, and

with an ordinary expansion arch bar placed through the tubes on the buccal sides, and the nuts on the distal side of the tubes, the fracture could be reduced completely by gradually tightening the nuts on the arch bar, after which with wire ligatures I would lace each tooth between the bands firmly to the bar. I should rely solely on this appliance and frequent irrigations, and expect no trouble or complications.

TREATMENT OF FRACTURE BETWEEN SECOND BICUSPID AND FIRST MOLAR.

In our second class, for a fracture between the first molar and second bicuspid, I should select a Lukins clamp band for the second molar and first bicuspid, through the tubes of which I would place a traction bar, with the nut in front of the bicuspid, tighten as much as necessary, and ligate the intervening teeth to the bar. In this case I would want the assistance of the old-style bandage, to prevent as much movement of the jaw as possible.

TREATMENT OF FRACTURE IN THE ANGLE OF THE JAW.

In the third case, in a fracture in the angle of the jaw, I would use Angle's fracture bands on two teeth in both the upper and lower jaws on the side of the fracture, and on one upper and one lower tooth on the opposite side, close the teeth normally, lace the lower teeth firmly to the upper ones, and keep them in this position. This, however, is a very dangerous method, on account of the possibility of strangulation in the case of vomiting, coughing, etc.; this should be guarded against as much as possible. In the place of the Angle bands, I have in two cases used with splendid results a strong wire ligature twisted around the necks of the teeth. This serves very well as a substitute, but the wires will stretch and allow some misplacement of the ends. The method of closing the jaws firmly will be found necessary also in some cases where a loss of a great amount of bone has occurred, as in the cases I and II in the report which will follow. This method, in connection with the Lukins bands and arch bar, should give ideal results.

TREATMENT OF FRACTURE OF THE MAXILLA.

The treatment of a case of class four will depend entirely on the extent of the fracture, which will be illustrated in the report of case VIII, which was very simple, and in that of case IX, which was very complex and difficult. In the majority of fractures of the maxilla, more or less suppuration is to be expected, as a result of small spiculæ of bone that remain in the fracture and act as an irritant; these may be gradually washed out and removed as they work to the surface. In the treatment of a fracture of this kind, one need not be alarmed to find in the vicinity of the fracture a fistula and a considerable amount of pus flowing therefrom. The operator may know that a spicula of bone is present, which with a probe and excavator can usually be located and easily removed. In view of this fact, together with the rapid decomposition of the oral secretions and the difficulty of removing débris that collects around the teeth in this condition, I wish to emphasize the importance of frequent and thorough irrigation of the mouth. By applying the solution as hot as can be borne by

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the patient, the tissues are relaxed, free circulation is established, and the process of granulation is facilitated.

REPORT OF PRACTICAL CASES.

As a matter of illustration, I will now give a report of a few practical cases.

Case I. The patient, a man of about forty-five years of age, received a blow on the lower jaw, resulting in a compound fracture between the left cuspid and lateral. This case was seen on about the tenth day. Suppuration was very profuse, and considerable loss of bone tissue was noted, causing a marked malocclusion when the ends of the bones were placed in proximity and the occlusion was placed at normal, leaving quite a space between the ends to be filled in with new bony tissue. This case was treated by wire ligatures placed around the necks of one molar and two bicuspids above and below on each side; then the teeth were placed in normal occlusion, and the wires that were around each opposing tooth were twisted together very tightly. This was supplemented with bandages, etc. The mouth was frequently washed with a one per cent. sterile solution of carbolic acid, and in about four or five days the suppuration was arrested, and a complete union was established in about five weeks, with good occlusion.

Case II. This case was also one of a man of about forty-five years of age. The fracture had occurred between the lower left central and lateral, the lateral being lost completely. This case was first seen on the twenty-fifth day after the accident, during all of which time there had been the most profuse formation of pus, which had destroyed enough bone tissue so that the canine and the central would touch, apparently in a normal position, when the ends were left at rest. This case was treated by thoroughly curetting the ends of the bone, and the teeth were placed in normal occlusion, and ligated with the same wire ligatures as in the case just described, which when tightened left a space of approximately one-quarter of an inch to be filled in with new bone. The teeth were kept ligated for about eight weeks, when the ligatures were removed, and a temporary bridge was placed on the left cuspid and bicuspid on one side of the fracture, and on the right left central, lateral, and cuspid on the other, which remained for some months. This was removed, and a sound, healthy union obtained, with practically normal occlusion.

Case III. This case was that of a young man of about twenty-one, with a compound fracture between the left cuspid and lateral. I saw the case first on the eighth day after the accident, when suppuration was very profuse. I used Lukins' clamp bands and arch bar, the bands being placed on the second bicuspids with all intervening teeth laced firmly to the bar. The case was kept thoroughly irrigated by the nurse at the hospital and required little of my attention after the first adjustment. The patient was dismissed in about four weeks. Occlusion on the right side was slightly open at that time, but was restored to normal in about two months.

Case IV. The patient, a man of about thirty, had suffered a fracture in the same position as the one preceding. The case was seen about ten hours after the accident. An appliance was placed as in the preceding case. No infection occurred, and there was little swelling. The patient was dismissed in three weeks with ideal results.

Case V. The patient, a man of about forty-five, presented a compound fracture between the lower left cuspid and bicuspid, also between the left first molar and bicuspid, and between the body and ramus of the jaw. This was complicated with the concussion of the brain and other general traumatic conditions, all of which kept his life in a very uncertain balance for some time. The fracture was treated with Lukins' clamp bands on the second molar and cuspid, the latter being supplemented with bands on the central and lateral for support. These two fractures were drawn together by a traction bar placed through the tubes of these bands, with a nut in front of the cuspid tube, and tightened; the intervening segment and teeth were ligated firmly to the bar. Angle's fracture bands were placed on two teeth in the upper jaw, also one on one upper and one lower tooth on the right side. The teeth were then placed in normal occlusion and ligated firmly,

which brought the distal fracture into good position. The distal fracture was the first of the three to unite. The case was discharged in about seven weeks, with good occlusion.

Case VI. This case was one of a man, twenty-five years of age, with a compound fracture between the lower left first molar and bicuspid, and an oblique fracture between the body and ramus. This case was treated essentially in the same way as case V, with Lukins' clamp bands and traction bar with Angle's fracture bands on the upper teeth, the teeth being held in normal occlusion with wire ligatures as in case V. The suppuration was very profuse for about ten days. The case was dismissed in about seven weeks with good occlusion. The fracture in the angle of the jaw was the first to heal.

Case VII. The patient was a child of about fourteen, with a compound fracture between the lower left cuspid and bicuspid. The teeth were not at all close. I made loosely fitting German silver bands for the two bicuspids, the cuspid, and lateral, placed them in position, took an impression with modeling compound, removed the bands with the impression, poured a model, soldered the bands firmly together, and stiffened them thoroughly with a metal bar soldered to each band across the lingual side. I cemented this appliance in position, and had no further trouble with the case. I mention this case in order to show that the practitioner will meet cases in which he will have to devise a method of his own.

Case VIII. The patient was a man, sixty years of age, with a fracture of the maxilla, or, more correctly speaking, the alveolar process, including the six anterior teeth and the right bicuspid, had broken loose from the maxillaries. This case was treated by means of Lukins' clamp bands on the molars, with the expansion arch placed in position, with the nuts anterior to the bands, and the anterior teeth ligated to that, supplemented with a bandage to prevent any attempt on the part of the patient to use the jaws. In about three weeks the appliance was removed, and the patient has good teeth today.

Case IX. The patient, a man of about thirty-five, was kicked by a horse, the toe of the shoe striking just under the nose, breaking both maxillaries and severing both palatal bones from all bony attachments. There was also a compound fracture through the median line which completely separated the bones. The injury to the soft tissue was severe, and hemorrhage very profuse. I first reduced the median fracture with Lukins' clamp bands on the molars with an expansion arch, placing the nuts on the distal side of the bands, which, when tightened, reduced the median fracture beautifully. The teeth were then in the mouth like a loosely fitting plate This fracture was reduced by means of a swaged aluminum plate, which fitted loosely over the teeth with a small roll of modeling compound placed in the rim to prevent any movement or slipping of the teeth. This was placed in position and held there by means of an Angle headgear and retracting bar. By irrigation of the nose, mouth, and throat with a two per cent. sterile solution of carbolic acid every hour. I was able to prevent any infection and to secure beautiful results, although at the outset the prospects for a successful termination were anything but promising.

Discussion.

Dr. Bush Jones, Dallas, Texas. I always thought that Temple was a law-abiding community, but from Dr. Murphy's paper I would judge that its people are a very scrappy lot. I did not believe that there had been so many fractures in the whole state of Texas. I do not think we have had more than three or four in Dallas in the past fifteen years.

I wish to congratulate Dr. Murphy on his paper. My experience with fractures is very limited, and those that I have had to deal with have given me a great deal of trouble, which Dr. Murphy does not seem to have had. If I happen to get my maxilla fractured I am going to look up Dr. Murphy.

Dr. S. M. Myers, Cleburne, Texas. I agree with the essayist that most of these

fractures occur on the left side. I have had some six or seven cases in my practice, and with one exception, all have involved the mandible on the left side, the exception being the right side in the upper jaw. Why this is the case I do not know. I recall that in one case a man met an antagonist in the road, and was struck on the right side of the lower jaw, and the jaw was fractured in the bicuspid region on the left side. Another case which I treated was that of a man who was struck on the left side, the jaw breaking on the same side. A little boy about a year old was brought to me some time ago; the mother had left the baby in its buggy on the porch and had neglected to scotch the wheel. The buggy rolled off the porch, the baby was spilled on the ground, and his lower jaw was broken on the left side. In the treatment, I simply reduced the fracture and, strange to say, in a few days only a little swelling was left. I simply instructed the mother to keep the baby from lying on the injured side of the face, and to see that no pressure was brought to bear on the jaw.

Why these fractures occurred all on the left side of the mandible, I do not know, nor whether other members of the profession have had the same experience.

As to Dr. Jones' remark about Temple being a scrappy town, I can say that few of these cases which Dr. Murphy mentioned came from my town, being men from the Santa Fé railroad shops.

As to the essayist's technique, and as to the cases being so easily managed, in a paper like this the essayist of course cannot give the minute details of every one of his measures. Some of the cases get along nicely, and others are hard to treat. If we have a patient with a fracture and he wants to do right, he will help the dentist a good deal in the treatment of the jaw; if not, the dentist will have difficulty with him every time. There is always more or less trouble in the treatment of these cases, and ingenuity, skill, and good judgment are required.

Dr. J. P. Gray, Nashville, Tenn. I was glad to hear Dr. Murphy say that he wasted no time in the reduction of fractures. It is often very difficult to reduce a fracture if treatment is delayed any length of time after it occurs. Immediately after a fracture occurs, the muscles become rigid, and if treatment is delayed for a number of days it becomes necessary in many cases to administer an anesthetic to reduce it.

The essayist did not tell us all, with reference to making these appliances for holding the fractured bones in position. He did not say that in some cases he had to make the cast over, for example, in cases where the short end of the bone was drawing up, and the long end dropping down. The operator cannot bring the fractured ends of the bone together without cutting the impression and reforming it, and then, with the appliance in position, he can draw the two ends of the bone together.

I have found from considerable experience with fractures, that they occur usually between the first and second bicuspids. In nearly all the cases that I treated as dental surgeon for a railroad and in a hospital, where a great many such cases present, the fractures occur at this point, due, as a rule, to a blow on the side opposite to the fracture.

The essayist is correct in stating that after a few days the patient can be dismissed until the time for removal of the splint, but of course in a compound fracture more attention is necessary. Among

the large number of cases I have treated I have never seen one fracture in an edentulous mouth during the entire ten years that I was doing work as railroad surgeon, that immunity being due to the yielding nature of the parts.

I do not know why so many fractures occur on the left side. I was of the opinion that they were about equally divided. I can see, however, why the right side is stronger—because as a rule the patient uses that side more. In some of these cases there may be edentulous spaces on the left side of the mouth, possibly due to the non-use of the jaw on that side.

Dr. L. P. Robertson, Marlin, Texas. Dr. Murphy was considerate enough of my opinion of this work to request me to discuss this paper, and sent me a copy of it for that purpose. I read the paper carefully, and was struck with its practical value. Usually papers read on this subject are theoretical. The essayist has made his paper so clear and so practical that almost anyone can understand it, whether he has had any experience with this sort of work or not. Because of his relation with a railroad hospital he naturally has had to treat many more cases than the average dentist would have.

In several cases, Dr. Murphy has applied a method that in my opinion is entirely original with him as far as I know, namely, the use of the Lukins clamp bands with the expansion bar. By the use of these bands, as explained, he is enabled to reduce a fracture and hold it practically rigid. This so simplifies the work that it is unnecessary to make a cast, which is always a trying task in these conditions. By means of this bar and bands on the teeth the operator is enabled to draw the fractured bones into place and hold them rigidly in position. This apparatus is not at all cumbersome, but enables the patient to use his mouth with more comfort than he could with any other appliance. The operator and the patient are also enabled to give prophylactic attention to the case, which fact is worthy of our consideration.

Dr. Murphy (closing the discussion). For Dr. Jones' benefit I wish to relate one case that I have treated since my paper was written, and which is the worst case I have treated so far.

This was the case of a man who was kicked in the face by a horse, receiving nine distinct fractures, five in the upper and four in the lower jaw, not including a fracture of the nose, which I did not treat myself. This case was treated essentially in the same way as the cases mentioned in the paper, and with practically the same appliance. In addition to that I made an appliance of my own. I formed out of soft pine a U-shaped piece to fit underneath the jaw, and with the Angle head-gear this was drawn up tightly so as to hold the lower jaw in position. The difficulty consisted in getting the upper bones into position, and the only way to do that was by closing the mouth, making the lower teeth act as a splint for the upper, which was accomplished by bandaging the jaws together. The second day after the fracture was reduced, the patient developed facial erysipelas, with a temperature of 105°, and for a week it looked as if he would die; but finally he rallied, and today he has a fair occlusion. I took out a segment of the lower jaw between the lateral and central on one side and the canine and lateral on the other.

I have not yet removed the appliance, but the patient is getting along and is in splendid condition.

I wish to thank you all for the kind consideration given to my paper.

The subject was then passed.

The next order of business was a paper by Dr. T. G. Bradford, Dallas, Texas, entitled, "Surgical Operation of the Frenum Labii Superioris," which here follows:

Surgical Operation of the Frenum Labii Superioris.

By T. G. BRADFORD.

The subject selected is of special interest to the dentist who has ever undertaken such a case. The attachment of the muscle of the frenum labii superioris is from the upper lip to the gum tissue, just above and between the central incisors; its position is at the median line, and its removal surgically is indicated when its attachments are very low, and when its peripheral fibers extend between the central incisors and attach to the gum tissue on the anterior palatal portion of the mouth just back of and between the linguo-gingival ridge or cingulum of the central incisors. This attachment causes the separation of the central incisors, resulting in the malocclusion of the teeth and also in an impediment of speech by the escape of air between the teeth.

"Nature never corrects a deformity unaided," and if such a deformity is inherited, it is intensified. In pathological and physiological conditions, if a cure is to be effected the cause must be removed. It is an easy matter to draw the central incisors together, but it is very difficult to make them stay. Retaining appliances may remain on these teeth from one to two years and longer, but when they are removed the teeth will assume their former abnormal position, because the constant moving of the lip moves the muscle, which extends between the teeth.

MODUS OPERANDI.

Bands of German silver, which is superior to any other metal for this work on account of its durability, strength, and lightness, are made for each central incisor, and spurs are soldered to the mesio-labial surface of each band at the right edge of the teeth; if this is not done, and brass ligatures are applied to draw the teeth together, one of the teeth will elongate and be in supra-occlusion. If these spurs were soldered to the center of each band or to the distal surface, if pressure were applied, there would be a rotation of the tooth in its socket, and an additional malocclusion would be established in trying to correct the first. When these bands are ready for cementation, they are placed in boiling H_2SO_4, and then in water, removed, and thoroughly dried. Cotton is placed under the lip and the teeth are dried by the use of alcohol and hot air. The cement is mixed very thinly, and well spatulated to the consistence of thick cream, and then with a spatula the cement is placed in the bands and these are pressed home, using a band-driver to assist in a more perfect adaptation of the bands. Then the bands are burnished well, so that they may fit accurately, which will also prevent an accumulation of food. The appliance is dried thoroughly with hot air, and all excess of cement is removed

to prevent any further irritation of the tissue by the cement. The patient is dismissed till the next day, when the cement will have set sufficiently, so that pressure will not loosen the bands.

The operator is then ready for the surgical part of the work; it is needless to even mention asepsis to a body of professional men; the dentist or physician who does not perform his operations antiseptically will be relegated to the past by his own acts; he is fossilized by a lack of education.

A general anesthetic is not indicated, as this operation is painlessly performed by the use of a hypodermic injection of ½ of 1 per cent. eucain or of the same amount of cocain; never should over a 1 per cent. solution of either of these anesthetics be used in any condition. I prefer the eucain to all local anesthetics.

After the parts are anesthetized, a lancet is used to cut between the teeth. This will be a guide to the operator, so that when the electric or an actual cautery is applied he will not destroy any of the pericemental membrane of either tooth. It is not necessary that any of the alveolar process be destroyed; only the abnormal amount of muscular tissue should be removed between the teeth. The object of this cauterization is to stimulate the formation of scar tissue; moreover, the approximal fibers are drawn together, and the cicatrix thus formed aids in retention. The cause of the separation of the centrals is removed, and nature does the rest.

POST-OPERATIVE TREATMENT.

The soreness is allowed to subside and annealed brass wire of No. 31 gage is used to encircle the spurs, and the wire is twisted a little every third day. It will then be but a short time until the space is closed. Rubber ligatures should never be used, as they make the teeth too sore on account of the continual pressure, and besides, the amount of pressure that is applied in using rubber cannot be judged.

The lateral incisor will move proportionately with the centrals, on account of the attachments of the fibers at the gingival third that attach from tooth to tooth; the work can be done painlessly in this manner.

At the same time a V-shaped piece of the muscle should be cut out, and at the visits of the patient the lip should be gently manipulated, so that the parts will not grow together; the attachment of the muscle is forced higher on the alveolar process and also on the lip, so that in using the lip afterward in talking, the fibers will not be moved that go between the teeth.

After the teeth are drawn together, let them rest for a few weeks, so that all tenderness may disappear. Then bands for each central are made, soldered together at their incisal portion only, and then cemented in the manner described before. These bands are to remain undisturbed in this position for at least a year or more, the time of retention depending upon the age of the patient and the occlusal contact of the teeth.

Discussion.

Dr. Bush Jones, Dallas, Texas. This interesting paper treats of a condition that occurs in practice more often than we think. Only a few years ago Dr. Bradford brought to my attention a case in which there was separation between the incisors, and also the method of treating it. After this demonstration I

noted this condition in my practice repeatedly. In the past two months I have had two such cases. I find it difficult to convince the parents that this operation will overcome the trouble, and also that the condition is abnormal. To illustrate that, there is a family in our city, the father being one of the best business men in the city and the mother a club-woman. They had a daughter of fourteen years of age, who came to me, and I told her to ask her mother to accompany her the next time she presented. I showed the mother the trouble, and after explaining it to her as best I could, she turned to me and said, "Doctor, do you think that is the cause of it?" I told her that was what the men who regulated teeth said to be the cause, and that I had seen this trouble corrected several times by correcting that muscle. The mother then told me that she had the same condition, and that her mother had told her that it was a sign that "she and her mother were to live far apart." Gentlemen, that is an actual occurrence, and it happened with one of the best educated women in our city. As I said, the main trouble lies in convincing the parents that this is the cause of the trouble. The correction can be made, as Dr. Bradford has stated. We see these cases frequently, but do not always give them due notice. In many cases the child cannot raise the lip as high as the gingival border of the teeth, but after the operation the lip is normal, and the teeth come together in the proper way.

I wish to thank the essayist for his paper, because it treats a subject that we should all be interested in, and one that we should profit by.

Dr. W. O. Talbot, Biloxi, Miss. I have had some experience in the treatment of this trouble, and I find that with young patients below twelve years, I have little trouble in holding the teeth in position after using the cautery. I find the operation quite difficult, however, in older patients of twenty years or more, when the bones are well formed. In some of these latter cases I have held the teeth in good occlusion for a year, but when the appliance is taken off, they finally drift back to the old positions. I have not been able to overcome that trouble in some cases. There are a great many, however, that can be treated successfully, and I think the earlier we treat the cases, the better results will be obtained.

Dr. W. C. Smart, Edgewood, Texas. In one case of this kind I obtained beautiful results. I have another case on hand now about which I wish to ask some advice. I have a little girl of twelve years of age for whom, about a year ago, I extracted a deciduous lateral incisor. As yet she has no permanent lateral incisors, and the centrals are about one-eighth of an inch apart. The question I wish to ask is: Would you draw these teeth together, or wait until the lateral incisors come in?

Dr. Bradford's paper has been of much benefit to me. I have studied this condition quite a good deal, but as yet have not reached the point where the cautery has been of so much help to me as suggested by Dr. Bradford. My method is to remove a portion of the gum with the lancet, and I have had beautiful results in some cases.

I should like someone to give me a suggestion with regard to the case mentioned, in which the laterals have not yet erupted.

Dr. Gorman. How old is the patient?

Dr. SMART. Twelve years.

Dr. GORMAN. When you move the lip, does the under portion move?

Dr. SMART. Just a little.

Dr. GORMAN. If there is a decided movement in that lower end of the frenum labii in moving the lip up and down, then I would suggest bringing the teeth together, as that would possibly hasten the eruption of the laterals.

Dr. TALBOT. I should like to suggest that it might be well in that case to have an X ray made to determine whether or not the laterals are in the jaw. If they are, I would advise the pulling together of the centrals to make room for the laterals, and holding them, and, if they are not there, make plans for later bridge work.

Dr. L. P. ROBERTSON, Marlin, Texas. Answering the question of Dr. Smart in regard to the absence of the laterals, it is of course easily found out by an X ray whether or not the lateral incisor will ever erupt in the patient. It is very probable that the patient may have no laterals. As we all know, these teeth are absent more frequently than any others. There is no occasion, however, in my opinion, why Dr. Smart should wait to draw the centrals together. It will have to be done some time, whether that patient has laterals or not. If the laterals finally do erupt and there is no space for them, they will move out to the front, but I fear that the patient will have none. If the laterals do not appear, the spaces will have to be filled with artificial substitutes. We have all seen cases in which the laterals were absent, and if these cases are allowed to go on without treatment, a considerable space always results between the centrals, causing a very disagreeable disfigurement in the upper arch. My idea is that the sooner we can treat these cases the better, and I deem it wise to expand the jaw and make plenty of room for the laterals. This ought to be done as early as possible to keep the canines from moving forward and occupying the place of the laterals. If that happens, when the patient is sixteen years of age there will be difficulty in retracting the teeth and making space for the laterals. We know that this is an absolutely necessary measure in order to obtain a symmetrical appearance in the fulness of the mouth, and I would not delay the drawing of the centrals together.

Dr. BRADFORD (closing the discussion). As far as this model [demonstrating] is concerned, with reference to the condition that caused the separation, this was intensified by the absence of the lateral incisors. Seldom do we see such pronounced maloeclusion as this, and the real seat of the trouble is in this lip. In working the lip the fibers of this muscle come between the teeth, and it is these dense inelastic fibers which, when the teeth are brought together without modifying, will draw the teeth back. My method is to cut a V-shaped space out of this muscle; when this is done, the attachment is thrown higher on the process, and after it is cut out, the lip should be lifted up and cauterized so that the fibers will not come back together. This incision should be made in the central part, so that when the cautery is used, it will not destroy the pericemental membrane. It is not necessary to destroy any of the process by the cautery, as it is only the abnormal muscular fibers that cause the trouble. Another condition which is overcome by this operation is the impediment in speech due to the escape of air between the teeth.

In reply to the question with reference to the central incisors, the time to begin the treatment of any case of malocclusion is as soon as it manifests itself, and the operator should always know what he is going to do. If the lateral incisors have not erupted, a skiagraph should be taken, which will disclose whether these teeth are present in the jaw or not; but in any event, the teeth should be placed in their proper position without delay.

The President then announced that pursuant to the resolution presented by the Executive Committee, a memorial meeting would be held at this time in honor of the members of the association who had died since the last meeting.

At the request of the president, Dr. H. C. Hassell read a biography of Dr. J. Y. Crawford, Nashville, Tenn., written by Dr. Burton Lee Thorpe of St. Louis, as follows:

An Appreciation of Dr. James Young Crawford.

The telegraph flashed the sad news of the sudden death of my friend. I wipe away a tear and pen these words to his memory, not that they will benefit him, for he well knew my high regard for him in his hours of life and health, but that those who read these lines may know of his generous nature, his worth, and his earnestness in the promotion of dental surgery, his chosen calling. His death occurred at Nashville, April 5, 1910, and was caused by angina pectoris, with which he had suffered for several months. He virtually died in the harness, as he had often expressed a wish to do. Funeral services were held at his late residence, 1910 Belmont Circle, Nashville, at 2.30 P.M., April 6th, Rev. W. B. Taylor and Rev. E. B. Chappell officiating. The burial was at Mt. Olivet cemetery, with the following pallbearers: Honorary—Chancellor James D. Porter, Governor M. R. Patterson, Dr. J. B. Stephens, Major E. B. Stahlman, Hon. Benton McMillin, Dr. S. B. Cooke of Chattanooga, and Dr. William Crenshaw of Atlanta, Ga. Active—Dr. Duncan Eve, John W. Thomas, E. R. Richardson, P. A. Shelton, Dr. J. A. Witherspoon, W. E. Norvell, Dr. Stanley L. Rich, and Dr. W. W. Core.

James Young Crawford was born in Hawkins county near Rogersville, Tenn., June 2, 1846. He was the son of Rev. J. Y. Crawford of the Holston Conference M. E. Church South, who was one of the prominent preachers of the South in ante-bellum days. Young Crawford's boyhood was spent in West Tennessee. Owing to the war between the states, he had no school advantages after his twelfth year. At the age of fourteen, at the outbreak of the war, he enlisted in the Confederate army, serving in the commissary department in Florida for four years. At the close of the war he went to Bowling Green, Ky., where he studied dentistry under the tutelage of Dr. J. E. Breeding. Following this he located at McKinzie, Tenn., where he practiced until 1879, when he removed to Nashville, and soon took rank as a leader in the profession, and for years has stood distinctly as one of the foremost dental surgeons in the South. In 1879, '80, and '81, he attended the medical department of the University of Tennessee, from which he received the M.D. degree. Later he served on the medical faculty as professor of dental and oral surgery. Dr. Crawford always maintained that dental surgery is a *bona fide* department of medicine and surgery and should be practiced as such, believing

that of all specialties of medicine, the dental surgeon needs fundamental education in medicine more than any other special practitioner. The honorary degree of D.D.S. was conferred upon him at the first annual commencement of the University of Tennessee, Dental Department, in 1879.

In 1878 he was one of the demonstrators of operative and mechanical dentistry in this college, and in 1879 was professor of mechanical and corrective dentistry. In 1883 he was elected dean of the faculty and professor of operative dentistry, serving in this capacity until 1889. During the session of 1890 and 1891 he served as professor of clinical dentistry and oral surgery in the Dental Department of the Vanderbilt University. In 1905 he again became connected with the University of Tennessee, Dental Department, and was elected president of the faculty and professor of clinical dentistry, serving in this capacity until his death.

It was characteristic of Dr. Crawford that he always supported dental association work. He was a member of the Tennessee State Dental Society, and its president in 1883. In 1891 the state legislature passed an act to regulate the practice of dentistry in the state of Tennessee, and authorized the appointing of a state board of dental examiners. Dr. Crawford was a member of this board and its first president. He served in this capacity until 1894. In 1893 he was vice-president of the National Association of Dental Examiners. Dr. Crawford was active in the Southern Dental Association and served as president at the annual meeting at Galveston, Texas, August 30, 1889. He also was a loyal and active attendant of the American Dental Association, and was twice elected its president, in 1894 and again in 1895. He presided as chairman at the Horace Wells memorial meeting held at Philadelphia in 1895. In his President's address of the American Dental Association in 1895, he urged the union of the Southern Dental Association and the American Dental Association, to be known as the National Dental Association. Later he was a member of the committee of five appointed by the American Dental Association, and was prominent in bringing about the fusion of these two societies into the present National Dental Association at Old Point Comfort, August 5, 1897. He took a prominent part in this association, serving almost continuously as a member of its executive council until 1908. He also served on many of the prominent committees of the association and of the Southern Branch, in which he took a particular pride. Dr. Crawford was a member of the committee on organization of the World's Columbian Dental Congress held at Chicago 1893, also a member of the committee on organization of the Fourth International Dental Congress, St. Louis 1904, and honorary president and chairman of the committee on resolutions of the same. The last dental gathering that he participated in was the Fifth International Dental Congress at Berlin, August 1909, to which he was a delegate representing the National Dental Association. He was honorary president of the Jamestown Dental Convention in 1907, and had been elected an honorary member of practically all of the southern state dental societies, and granted a license to practice in several of the southern states. He was a member of the American Medical Association and the Nashville Academy of Medicine and Surgery, and an

honorary member of the St. Louis Society of Dental Science.

Dr. Crawford took an active interest in the professional associations and organizations; especially was he prominent at all national and at many state and local gatherings, where he took prominent part in the discussions and executive work. For years he has been known as "the silver-tongued orator of the South," and justly deserved the title, until the last few years, when failing health impaired his voice. His most notable addresses of late years were delivered at the opening session of the Jamestown Dental Convention in 1907 and at the opening session of the National Dental Association, Birmingham, 1909; both were eloquent and patriotic appeals for high ideals in our profession.

Dr. Crawford was a good citizen; he was possessed of a genial disposition, and had won a large circle of friends not only in his profession but among the people generally, who admired him for his charming personality and the deep interest he ever manifested in the welfare of his state and city. He was a member of the Methodist Church, South, holding his membership in McKendree Church at the time of his death, but for a number of years, while a resident in the west end, Dr. Crawford was one of the officials of the West End Methodist Church. He was ever ready and willing to contribute liberally of his means to the promotion of the church's work. In politics he was a democrat, and of late years attended all the national conventions of the democratic party.

In 1885 Dr. Crawford married Miss Louise Haggard, daughter of the late Dr. W. D. Haggard, and a sister of Dr. Will D. Haggard, Jr., of Nashville. He is survived by his wife and three children—J. Y. Crawford, Jr., Jane Douglas, and Mary Louise.

Dr. Crawford held superior rank as a skilful operator, and was always eager to instruct members of his profession. His patients were most loyal and appreciative, and frequently would respond to his telephone requests to call at his office to show some visiting dentist some particular operation he was anxious to demonstrate. We who have enjoyed the privilege of being guests at his hospitable home could but admire his devotion to his interesting family. As wine warms one's blood and love warms one's heart, so did the spirit of devotion to his profession predominate in his career, overshadowing all else except his devotion to his wife and children.

He has been an inspiration to many young men, and did much both financially and by advice to aid them to acquire a dental education and to start in practice. He always urged them to become identified with dental society work, of which he was probably the greatest exponent in the southern states.

Dr. Crawford was one of the kindliest men in the profession. He was a good lover and equally a good hater, but a generous one, without the malice that rankles with most men who have detractors.

As I knew and appreciated him, he exemplified the following sentiment: "He has achieved success who has lived well, laughed often, and loved much; who has gained the trust of pure women and the love of little children; who has filled his niche and accomplished his task; who has left the world better than he found it, whether by an improved poppy, a perfect poem, or a rescued soul; who has never lacked appreciation

of earth's beauty or failed to express it; who has always looked for the best in others and given the best he had; whose life was an inspiration, whose memory a benediction."

Dr. W. G. MASON moved that the association extend to Dr. Thorpe a vote of thanks for his valuable contribution to the memory of Dr. Crawford.

Motion carried.

Dr. J. D. TOWNER moved that a committee be appointed to draft resolutions on the death of Dr. Crawford, to be spread upon the minutes of the association, a copy of it to be transmitted to Mrs. J. Y. Crawford, with the sympathies of the association.

Motion carried. [See resolutions on page 20—Minutes of Executive Council.]

Dr. B. F. THIELEN, Paris, Texas. I had the pleasure of being with Dr. Crawford a great deal in his office after graduation. I knew him in work and I knew him in play, and do not believe that the dental profession ever had a more enthusiastic member, one who had his profession more at heart.

I would like to cite a little incident in my experience with Dr. Crawford that shows how loyal he was to the profession in America. Shortly after I left Nashville I had an opportunity to go to Berlin to practice. I considered the matter seriously and wrote to many friends, among them Dr. Crawford, asking advice in the matter. Dr. Crawford wrote me a long letter, pointing out the fact that the profession was not recognized properly in Europe, and advised me to stay in America. He made the statement that American dentistry stood highest in the world, which showed his love for American dentistry, and I feel the association has acted properly in adopting resolutions to his memory.

Dr. J. P. GRAY, Nashville, Tenn. I suppose I knew Dr. Crawford better than any man here, as I was very closely associated with him both in practice and in college work. I knew the worth of the man; knew his enthusiasm, and knew his love for his profession. I do not believe that we ever had a man in the profession who worked harder than Dr. Crawford. He loved the profession better than almost any man I ever knew; he talked dentistry, slept dentistry, and almost ate dentistry, and was constantly preaching dentistry. A friend of his on one occasion said to him, "Doctor, you have been in our house for some time, and I do not think you have talked of anything but dentistry." He loved to talk dentistry, and he loved his profession. I do not think he ever talked fifteen minutes in his life without getting on the subject of dentistry, and he was very good when he got there. His example was good. Dr. Crawford had his faults, as we all have, and some large faults, but, if convinced, he was always ready to agree that he was wrong. He was a good hater, as the essayist has said, and he was just as good a lover. He might get angry with you, but if you went to him and talked to him, he would listen to you, and he would forgive and ask forgiveness.

While I am on my feet, I would like to say a word with reference to the other men whom we are commemorating. Dr. Jewett was a man well known in the profession, a good teacher, and he devoted a great portion of his life to that work. In his family life he was a lovely and charming man.

Dr. Whitsett was young in his profession. He devoted much of his life to

teaching. He worked hard and built up a fine practice in his home town. He was president of the alumni association of Vanderbilt for two years, and he died in the harness—another case of over-work. In fact, all three of the men I have spoken of are cases of over-work. You men must remember that you cannot go beyond a certain limit without being hurt. Dr. Crawford did not work primarily for money. He had a great practice, but he did not work for money, and left his family in moderate circumstances. He cared but little for money, but like many other of the great men of the profession who have had no other sickness, he worked himself literally to death. So I beg of you, as a friend of the profession, that you take your holidays regularly and rest, not this summer but any time that you feel that you need this rest, and get away and leave your practice. Life is better than death and health is better than sickness, and so you must, in order to do your best for the profession and for yourself, conserve your strength. Many men are today working themselves to death, and these men are all examples of early death from over-work.

Dr. M. S. Merchant, Houston, Texas. I first met Dr. Crawford in 1889, when he presided over the meeting of the Southern Branch at Galveston. I was introduced to him by Dr. Storey in such a manner that Dr. Crawford took an interest in me and was always my friend, and we corresponded off and on until his death. At Asheville he paid me some special attention that made me love him more. On my return from that meeting, as Dr. Gray perhaps remembers, he took me down to call on Dr. Gray, and until after midnight he kept us there and talked in his genial, lovable way, indulging in an occasional outburst of righteous indignation at the way in which certain men lived and acted. If you could love righteousness, you could love Dr. Crawford, and I was very much grieved when I heard that he was not to be here to answer the addresses of welcome to be delivered at this meeting, and no man regrets his death more than I do.

Dr. Guy Morgan, Paris, Texas. I would like to say a few words in behalf of Dr. Whitsett. I was extremely sorry to hear of his death. I knew him very well and knew him to be a man of high moral standards and a good worker in dentistry. He was a member of my class and became a demonstrator in his college because of his efficiency in the art. He was a personal friend of mine, a great favorite in his class, and a man whom we all thought a great deal of. He started in dentistry a little later than some who were in his class, but he studied hard, and was always thorough and competent in anything that he undertook. I am sure that every member of his class, as well as others who were associated with him in school, will regret his loss very much.

Dr. W. E. Walker, New Orleans, La. I think it a matter worthy to be brought to the attention of the members of the association, and perhaps a fact not known to all the members, that it was by a resolution of the great Crawford that the Southern Dental Association was resolved into a branch of the National Dental Association, which was the result of his own extensive work for the bringing about of the consolidation of the American Dental Association and the Southern Dental Association.

Dr. J. W. David, Corsicana, Texas. I considered my friend Dr. Crawford the greatest dentist in the world. As an ab-

solutely all-round dentist, I do not think that he had an equal. I had met him several times and had learned to love him. I was associated with him in work at Asheville, and got closer to him there than anywhere else. We were on the organization committee of the Fourth International Dental Congress, and we were both honorary presidents of the congress. We worked on the credentials committee together. Since that time, at the last meeting of the Texas Association, which was held in this city and at which Dr. Crenshaw was present, I had a little round with a quack dentist, and when Dr. Crenshaw saw Dr. Crawford at the next meeting he told him of this incident, whereupon Dr. Crawford sent me his photograph, saying that he wanted to show his appreciation of the stand I took in that instance.

Dr. W. C. Smart, Edgewood, Texas. It touches my heart when I think of Dr. Crawford being gone. Dr. Crawford has taken me into his office many times, where we have sat until midnight, and he has given me many hints that I have used in my practice and expect to use as long as I live. I did not hear of his death until yesterday.

Dr. Crawford took more interest in the young men in college than any other of our teachers. They all loved him. Dr. Crawford spoke and taught dentistry everywhere you met him. In every conversation he would bring up something regarding dentistry, something useful and well worth listening to. I am very glad that the association has adopted these resolutions, and while I am not a member, I approve of them very much.

Dr. T. L. Westerfield, Dallas, Texas. I suppose I knew Dr. Crawford at an earlier date than anyone present. I knew him as a young man when he came to Nashville to live, and during the eighteen years that I knew him there, and in the years after, he was always ready with an open hand and heart to help the young man along. Though there were but a few years difference in our ages, I always looked up to him as being an older man, a better man, and better fitted to advise the young men than anyone I ever knew. I loved him as a man, I loved his name and his deeds. He was a little eccentric in practice. He never liked amalgam as a filling material and almost disliked anyone who used it; by emphasizing his views on that subject he in my opinion did no harm, and possibly a great deal of good. The bold stand he took against amalgam and his firm advocacy of gold has done great good, and will be remembered as a contention for which he stood alone.

Dr. Crawford was a fluent and pleasing speaker and was considered the greatest orator in his profession. A good man is gone, and we will ever miss him.

Dr. J. E. Chace, Ocala, Fla. It is said that in the presence of the great emotions of life, silence is more eloquent than words, and yet how unfitting it would be for us to allow this meeting to come to a close without some expression of the feelings we had for our departed brother, friend, and co-laborer, Dr. Crawford. I well know that any words on my part are unnecessary to place his name so high on the pinnacle of fame and in so sheltered a niche that time itself shall not deface it; and yet I should be untrue to the best impulses of my nature if I should allow this occasion to pass without acknowledging the great debt of gratitude I shall ever owe to this great and good man. The meet-

ing of the Florida State Dental Society about ten years ago marks an epoch in my professional life. I remember that the president and the first vice-president were absent from that meeting, and it devolved upon me, as second vice-president, to assume the chair. Being young and without knowledge of parliamentary law, and with only a few minutes' notice, I was unprepared to assume the task. Dr. Crawford saw my predicament, and taking me to one side, in a fatherly way gave me such advice and encouragement as my situation much required. It was through his influence largely that I attended my first meeting of the Southern Branch, which I believe was held in Nashville the following summer, and at that meeting he extended to me such courtesies as a young and unknown member of the profession could not expect from a man on whose time such demands were made. I know there are many here this evening who looked on Dr. Crawford as I did, as a professional foster-father. These examples of his kindheartedness seem cold and lifeless when put into words, and yet such acts as these constitute life in its noblest manifestations.

Dr. Thorpe has given us a most interesting epitome of Dr. Crawford's life, and from this is seen how closely he was identified with the history of the profession for the past twenty-five years. It was love of that profession and the desire to see it placed upon the highest plane of proficiency and service which constituted the ruling passion of his life, and his death has left a vacancy in our councils and our hearts which can never be filled.

Dr. Morgan. I move that a committee of three be appointed to draft resolutions on the death of the other three men in honor of whom we are holding this memorial meeting.

Motion carried.

Dr. Hassell. I move that the committee of three provided for in Dr. Morgan's motion, together with the other committee appointed to draft resolutions on the death of Dr. Crawford, be instructed to draft resolutions on the death of these men; that these resolutions be spread upon the minutes of the association, and that we also send copies to the families of the deceased members.

Motion carried.

Motion was then made and carried that the meeting adjourn in honor of the deceased members, as suggested by the Executive Committee.

WEDNESDAY—Evening Session.

The meeting was called to order Wednesday evening, at 8.30 o'clock, by the president, Dr. Chace.

The first order of business was the reading of a paper by W. E. Walker, New Orleans, entitled "Oral Hygiene in Public Schools."

The next order of business as announced by the President was a paper by Dr. A. H. Ketcham, Denver, Colo., entitled "Are the 'New School Orthodontists' Practicing Excessive Expansion?" and read by Dr. J. A. Gorman, as follows:

Are the "New School Orthodontists" Practicing Excessive Expansion?

By A. H. KETCHAM.

When the principle of treating cases of malocclusion by placing each and every tooth in normal or ideal occlusion was given to the profession by Dr. Edward H. Angle, about eight years ago, there were some who questioned the truth of the principle, and many others who doubted its practicability. Even those who have accepted and practiced this principle doubtless have treated cases in which the advisability of its application in its entirety has seemed questionable from the point of facial art.

UNFAIR CRITICISM OF MODERN ORTHODONTIA.

I will confess that in some of my earlier cases, where I expanded the arches to the maximum, the result at the time of retention would seem to justify the criticisms of our old friends, namely, that by our excessive expansion of the dental arches we would produce too great a protrusion of the lips. The criticism also made that after the ordeal of such expansion our patients would be left nervous wrecks needs no answer, for the orthodontist who possesses the skill, coupled with the love for children which gives him the patience and tact to treat these cases successfully, soon acquires the requisite judgment enabling him to carry on his work with so slight a degree of discomfort to his little patients that the majority increase in weight and height, improving in general health to a greater degree than ever before in their lives.

The advocacy of extraction of one or more teeth in young patients on account of the strain imposed upon the patient's nervous system during the operation of expanding the arches, is merely a confession of a lack of the necessary skill, patience, and tact for treating orthodontia cases successfully.

DR. E. S. TALBOT'S CRITICISM.

The above criticisms, so often made years ago, have come to light again in the March issue of the *Dental Cosmos*, in an article entitled "Rip Van Winkles in American Dental College Faculties," by Dr. Eugene S. Talbot of Chicago. He also gives the impression that the upper first bicuspids may be sacrificed to allow unerupted canines to "come down," and that this may be done without detriment to the occlusion of the teeth, or to the facial lines, but actually with great benefit when compared with the expansion of the arches produced in order to make room for the retention of the normal number of teeth. While Dr. Talbot may have seen some cases which have caused him to form this opinion, yet it is no more fair to judge a method of treating cases of malocclusion by a comparatively small number of crudely treated cases than it is to condemn all cast fillings because a number

of imperfect ones are placed in the teeth, or to condemn all hammered gold fillings because so many have proved failures. Such an article from a person who poses as a critic of teachers, but who displays such gross ignorance of the development of the dental arches and the oral and nasal cavities, as well as the face, and of the very foundation of all dentistry—namely, occlusion—leads us to suspect that a Rip Van Winkle may have reawakened in the rôle of critic.

Fig. 1.

Fig. 2.

FIRST SUCCESSFUL STAGES OF TREATMENT OF A CASE OF EXPANSION.

SOME CASES OF EXTREME EXPANSION.

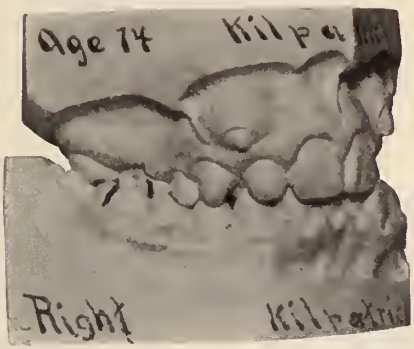
I will show a few cases in some of which extreme expansion was practiced, and I must confess that in at least one of these, when the regulating appliances were removed, we had a "bimaxillary protrusion."

I will endeavor to present the facts in an unbiased way, and allow you to decide whether or not in these cases, by retaining the full complement of teeth and treating for normal occlusion, we have obtained the best results, not only from the dental and nasal points, but in facial art as well, or whether the ultimate result, dental, nasal, and facial, taken as a whole, would have been better had we sacrificed a tooth or two, as indiscriminately advocated during the dark ages of orthodontia, and sometimes today.

In the case illustrated in Fig. 1 we have a boy of fourteen years of age, who is below the average in physical development, whose enlarged tonsils were removed at six years of age and adenoids one year later, but not until they had accomplished their baneful work in retarding not only the growth of the nasal space and of the dental arches, but of the whole anatomy of the boy as well. His lips would be called full enough, unless we remember that at fourteen years of age, when all the teeth with the

exception of the third molars have erupted, the lips should be quite full, almost protruding, in relation to the bal-

Fig. 3.



ance of the face. The width of all of the erupted teeth is as great as it ever will be, and the rest of the face has not nearly completed its growth, but under normal conditions will continue to increase in size for a number of years, until the apparent fulness of the lips in comparison with the rest of the face will have disappeared.

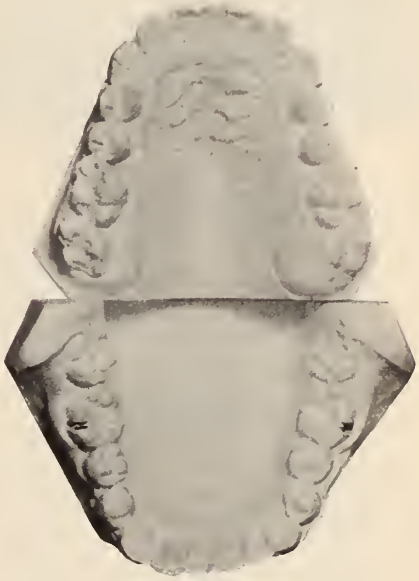
When treatment was begun (Fig. 2), this boy could not walk upstairs, ride a bicycle, nor run without breathing through his mouth. His rhinologist, Dr. T. E. Carmody, reported that the nasal space was about one-half normal, and that the septum was deflected. The condition of the under side of the thin plate of bone separating the oral from the nasal cavity was fully as bad. The distance between the upper second bicuspids at the gingival line was but 73/100 of an inch. All the upper teeth with the exception of the canines and second molars were in lingual positions in relation to the line of occlusion, while the teeth in the lower arch (Fig. 3) were in distal occlusion and quite irregular.

Extraction of two or more bicuspids would have been our only resource a few years ago, before Dr. Angle proved that

Fig. 4.

after expanding the arches to normal size, by moving out the crowns of the teeth, the roots follow, and that in two or

Fig. 5.



three years' time the roots and alveolar process will be in normal labial and buccal positions. Treatment by extrac-

tion was accepted before we knew it would leave the nasal space without its normal development, with the upper arch constricted, with an inefficient masticating apparatus and poorly nourished body.

Expansion was decided upon without a moment's hesitation. (See Fig. 4.) All the teeth were placed in harmony with the line of occlusion, the lower being moved forward until the mesio-distal relations of the two arches were normal. The tooth movement was completed in about eight months' time. The boy did not suffer, but gained in weight and health during the operation, and was in the best of spirits, as an instance will show: One day he came into the office with his face flushed and covered with perspiration. I found upon questioning him that he was feeling so good over his improved breathing that he had run the entire distance from his home to the office, about two miles, and had kept his mouth closed, breathing entirely through the nose—and be it remembered that Denver is 5000 feet above the level of the sea. (See Fig. 5.) Shortly after the retainers were placed upon the teeth he went again for examination to the rhinologist, who reported that the nasal space had increased in size until it was, as nearly as he could judge, seven-eighths of normal, and that the deflected septum had been nearly straightened. All this was accomplished by expanding the upper arch about 51/100 of an inch.

Fig. 6.

Fig. 7.

APPARENTLY "EXCESSIVE" EXPANSION.

All this sounds very well and the occlusion of the teeth is beautiful, so we decide never to sacrifice another tooth. But, on seeing the face illustrated in Figs. 6 and 7, with the lips puffed out as though the boy were blowing into his cheeks, do we not feel that perhaps, after all, the man without the knowledge of occlusion, but with a good strong grip upon his forceps, might be right?

This young man went to another state

FIG. 8.

FIG. 9.

FIG. 10.

FIG. 11.

to live, and was seen two or three times a year at first, during retention, when some slight adjustment of the retainers would be made. Returning during the Easter vacation just passed, after a year's absence, we find the teeth in the positions shown by the models (Figs. 8 and 9), about three and one-half years since the retainers were first applied. You will see that the occlusion of the teeth has remained very good indeed. The roots (Fig. 10) of all the ten anterior upper teeth have moved outward and there has been considerable "bone-building," as described by Dr. Angle as taking place in these cases. In the next illustration (Fig. 11) we have sections of the upper arches between the second bicuspids and the first molars, before treatment, immediately afterward, and as they are now. You will note the tremendous increase in size which has taken place along anatomical lines, just as nature intended these arches to develop. Dr. Carmody has drawn from his charts and memorandum of the case an outline of the nasal cavity on each of the models as it appeared at that date. His report is: "Nasal space, March 1906, before orthodontic treatment, one-half normal, deflected septum, slight adenoid tissue present. After treatment, December 1906, space about seven-eighths normal, septum almost completely straightened." April 1910, three and one-half years after orthodontic treatment, he reports: "Nasal space fully normal." A year ago the slight adenoid tissue was removed, and the inferior turbinates were trimmed slightly.

FINAL PERFECT RESULTS.

What of the face? Have those baboon lips protruded more and more from this "excessive" expansion? It is said that "The proof of the pudding is in the eating"—so the last photograph will tell the story. (Fig. 12.) This illustration shows what our friends who advise extraction have been forgetting, namely, that when all the teeth are put in occlusion, and harmony is established

Fig. 12.

in the balance of all the forces brought to bear upon them, the child is bound to develop and improve in general health, in growth, and in beauty, to an extent which would have been utterly impossible if the case had not been treated, or, what is fully as bad, had been mutilated.

Notice the strong lines of the face—the chin, showing determination, the firm lips, and their balance with the nose, forehead, and cheeks—and remember that for two or three years longer the upper two-thirds of the face will continue to grow and develop, because up to fifteen years of age it did not have a fair chance, but was stunted and

dwarfed; then imagine the further improvement which will take place. The boy is now nearly a sixfooter and quite likely will attain a development almost as great as that of his father, who is above six feet, weighing over two hundred pounds, and having broad, beautiful dental arches.

Fig. 13.

Fig. 14.

Fig. 15.

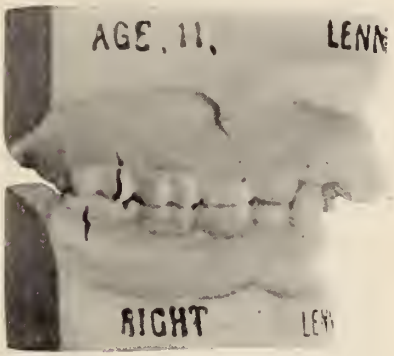
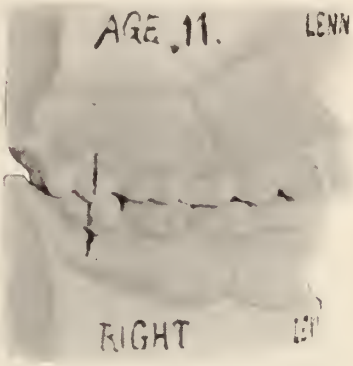


Fig. 16



A CASE OF PROTRUDING UPPER INCISORS AND RETREATING CHIN.

The next case is one of that type of mouth-breathers which is so often seen, with protruding upper incisors and retreating chin. (Fig. 13.)

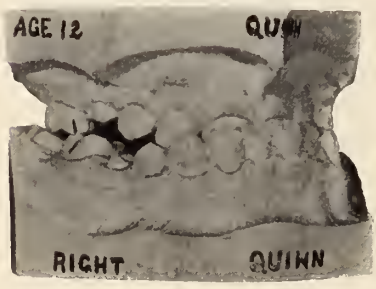
The usual advice in such cases at one time was to wait until the age of twelve or fifteen years—or until the case was almost as bad as could be—before having it treated. It has now been proved to the satisfaction of the great majority of orthodontists that the best time to treat these cases is even before the eruption of the permanent teeth, when the two arches may be placed in their normal mesio-distal relations, and sufficient

expansion secured so that the permanent teeth may erupt normally, and the nasal cavity also develop normally, and before this deformity of the features has become

Fig. 17.

so pronounced. The boy was eleven years of age when treatment was begun.

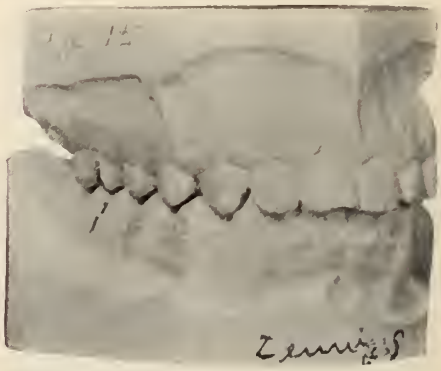
Fig. 19.



(Fig. 15.) In six months' time the teeth were placed in occlusion by moving the lower teeth forward and the upper back, and expanding both arches. (Fig. 16.)

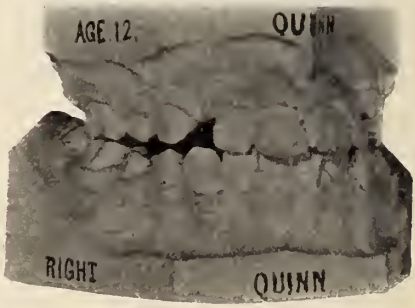
In the second photograph (Fig. 14) the improvement in the facial lines may be noted, while Fig. 17 shows the improvement in the features four years after treatment. Nature has not forsaken us; the upper lip is not protrud-

Fig. 18.



ing, and the chin and lower lip have improved in strength. The models of the teeth made in July 1909 (Fig. 18), four years after treatment, show that they are in normal occlusion, and when we say "normal occlusion," or "ideal occlusion," we have said everything.

Fig. 20.

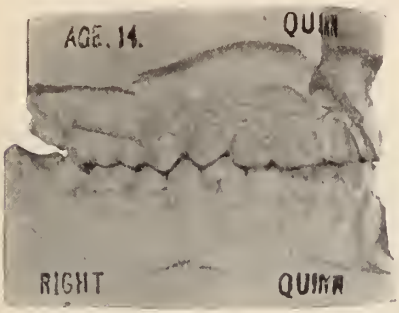


A CASE OF RETRUDING UPPER INCISORS WITH COMPLICATIONS.

In the third case (Figs. 19 and 20) we have the models of a girl, twelve years of age, whose upper permanent incisors

when erupting were caught on the lingual side of the lower incisors, but the molars were in normal mesio-distal relations. A dentist was consulted at that

Fig. 21.

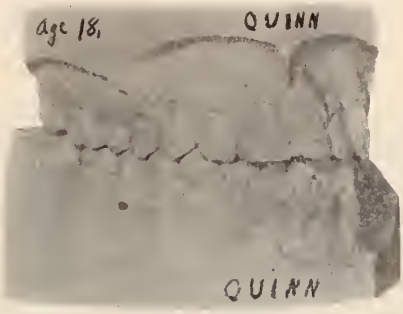


time, and the old advice was given of waiting until all the permanent teeth with the exception of the third molars should be in place. The patient followed

Fig. 23.

that advice for some years, until she fell into the hands of a better-informed dentist and was referred to an orthodontist, who moved the upper incisors out over the lowers. The case was then allowed to rest for about six months, or until the canines made their appearance, when the appliances were replaced upon

Fig. 22.



the upper and lower teeth, both arches expanded to their normal size, and the upper canines moved down into place by gentle pressure. When this was com-

Fig. 24.

pleted and the teeth were in normal occlusion the upper incisors slanted outward at quite an angle (Fig. 21, made on June 10, 1905), because over the roots

bony development was lacking by several years' growth, but models made in July 1909 (Fig. 22) show that the roots of all the anterior teeth have moved outward, with the alveolar process filling out nicely.

The flat upper lip before treatment, due to the lingual positions of the teeth beneath it, is shown in Fig. 23. The full appearance of the lower half of the upper lip after treatment, and the lack of development around the corners of the nose and the upper half of the lip is shown in Fig. 24.

The next photographs (Figs. 25 and 26) show what a great change has taken place in three and one-half years, which elapsed between completion of treatment and the taking of these photographs. A strengthening of the face as a whole is noted. The development of the upper lip and around the base of the nose is pronounced. The reason for this is that by normal occlusion and the normal balance of forces, including normal lip pressure, the apices of the roots have moved forward, and there has been a filling-in of bone in this region, nature doing her best to make up for lost time. The last of the retainers was removed from this case about two years ago.

Fig. 25.

Fig. 26.

EXTRACTION FOR CORRECTION OF MALOCCLUSION ALWAYS CONTRA-INDICATED.

Many men, when they extract one or more teeth in cases of malocclusion, claim that the others have been left in good articulation, or with a good "working" articulation. I want to state emphatically, that there is no good "working" articulation of the teeth unless they are all present and in ideal occlusion—of course the third molars may be excepted. A person may get along and do fairly well with an inefficient masticating apparatus, but that same person would do infinitely better and be better nourished, or at any rate

nourished with less effort, if he had an ideal occlusion of the teeth. A four- or six-cylinder automobile cannot be efficiently driven when one or two cylinders are missing; but a vast number of people are going around missing one, two, or three dental cylinders, and wondering why they do not feel up to par.

Fig. 27.

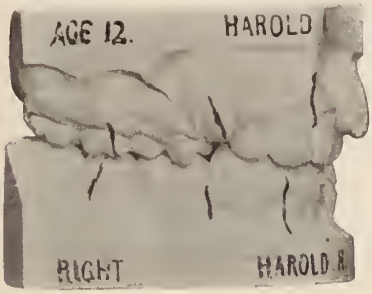
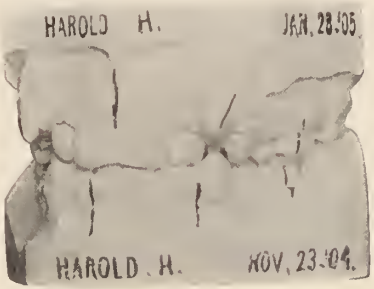


Fig. 28.



A CASE OF DIFFERENT MASTICATING EFFICIENCY ON THE TWO SIDES OF THE JAWS, DUE TO ILL-ADVISED EXTRACTION.

In the next case (Figs. 27–41) there is occlusion upon the right side of the mouth, which before treatment was very similar to that often described as "a good working articulation" by the men who advise extraction, and after treatment the "good working articulation" is just as efficient, but no more, than it was before treatment. On the left side of the mouth, each occlusal inclined plane on each and every cusp meets its grinding mate just as nature intended, giving efficiency in the grinding of food. This was the side of the mouth which was used in the preparation of food for the stomach, because it did the work well, while on the right side the cusps did not occlude as nature intended, and therefore a large cusp was trying to grind food in too small a depression, and a small cusp in a large depression; or, in other words, the "mill-stones" were not mates, and therefore did not do efficient work. The reason for this is apparent; the right lower is in distal occlusion, while a lower incisor is missing, due to an attack of forcepitis when the dentist discovered an

Fig. 29.

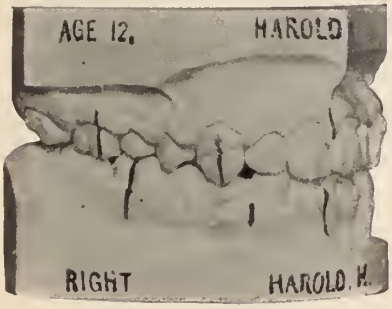
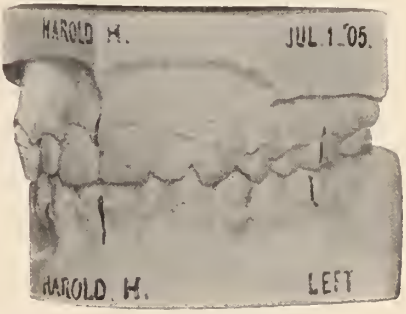


Fig. 30.



incisor erupting lingually. The effect on the face (see Figs. 31 and 32) was to de-

Fig. 31.

Fig. 32.

Fig. 33.

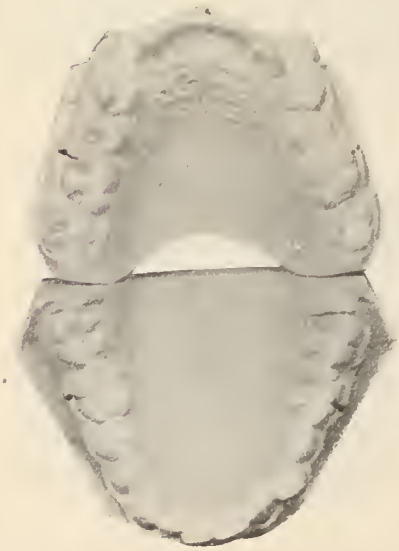
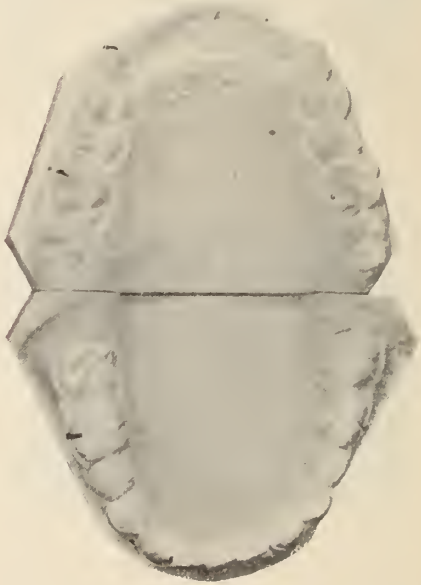


Fig. 34.



velop the muscles of the left cheek more than those of the right. It is seen in the patient's profile that his lips are nearly full enough; how can we expand the arch to normal without protruding the lips until they approach the prehensile type? From the lingual surface of the models (Figs. 33 and 34) it will be seen

that the upper arch was expanded until there was room enough to bring the canines into place, and to place the balance of the teeth in harmony with the line of occlusion; the lower jaw was expanded with the idea of gaining normal space for the missing incisor, which later could be replaced by an artificial substitute. But before treatment was completed the plans were changed, the incisors and the right canines were moved to the left, and then the molars and bicuspids on the right side forward, until they were mesial to their normal positions by the width of one cusp. The case was retained with the teeth occupying these positions, and the writer thought it quite a clever operation.

It will be noticed from the photographs taken at the time of retention (Figs. 35 and 36) that both sides of the face at that time were well developed, though the right was not as good as the left, and that the lips were not protruding too much. The models made recently (Figs. 37–39), four years after treatment, show that the case was retained successfully. It required but very little attention during retention. Photographs of the face made about one year ago (Figs. 40 and 41) show that the patient's profile is strong and beautifully balanced, while the full face shows that the masticating efficiency of the teeth upon the right side of the mouth is not nearly so good as that upon the left; that the muscles of mastication upon the left side have increased in development, while those upon the right have not done so to so great an extent, which proves that this young man finds the masticating apparatus upon the normal side of his mouth much better suited to his needs than that upon the one with the "good working articulation." For the last year he has tried faithfully to use the right side of his mouth as much as the left, but has not succeeded in increasing the develop-

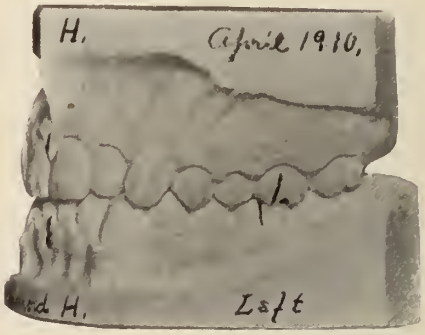
Fig. 35.

Fig. 36.

ment of that side of his face to the point attained by the normal side. I can sympathize with this young man, for in my own mouth the buccal teeth are in normal occlusion upon the right side, and do efficient work, while upon the left side they are in end-to-end "antagonism," and only punch holes through the food without grinding it and preparing it for the stomach. If I place a juicy piece of broiled steak between the teeth upon the left side, they just punch holes through it, feel lame, and the steak seems rather tough and stringy, but when transferred to the teeth on the right side of the mouth the meat is crushed finely, the juices are extracted, and thorough enjoyment is derived from the food.

Fig. 37.

Fig. 38.

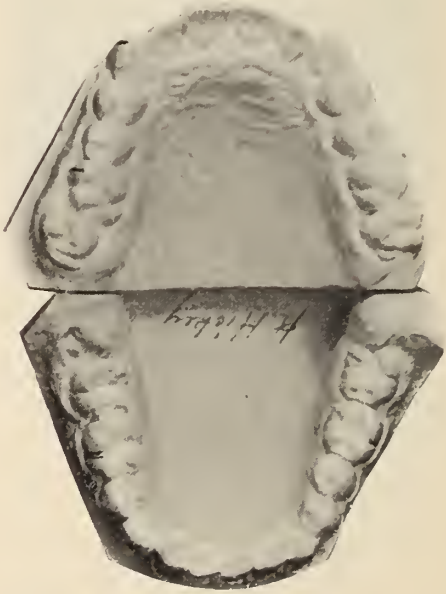


A portion of food is improved fully 100 per cent. for nutritive purposes, when, after having been masticated as thoroughly as possible upon the inefficient side, it is transferred to the normal side and masticated properly.

DELETERIOUS EFFECTS OF EXTRACTION.

I can truthfully say that by extractions performed in order to prevent nervous strain during orthodontia treatment, or to prevent protruding lips, we in reality are starting the patient on his journey through life inadequately prepared to meet the demands upon his strength;

Fig. 39.



we are inviting nervous breakdown, because such persons are the victims of an inefficient masticating apparatus and usually lack in normal breathing. The

facial lines, too, are badly mutilated by extraction; this may not be apparent at first, but as soon as maturity is reached, the lack of development of the dental arches becomes painfully apparent. There are thousands of men and women all around us with weak lips and faces, due either to lack of treatment or to the extraction of one or more teeth, performed in a futile attempt at the correction of malocclusion.

Fig. 40.

Fig. 41.

PRINCIPLE OF ORTHODONTIC TREATMENT.

In closing I wish to state the principle upon which all these cases but one were treated—the principle according to which practically all orthodontia cases are treated today—the principle which was given to us by Dr. Edward H. Angle. It is that "The best balance, the best proportion of the mouth in its relations to the other features, require that there shall be the full complement of teeth and that each tooth shall be made to occupy its normal position—normal occlusion" —and I might add that the same principle applies if we would have the most efficient dental apparatus and the best general health and development.

Discussion.

Dr. P. A. Skeen, Texarkana, Arkansas. I am glad to see that people differ in opinion. I admit that this paper was written by an able man in this specialty; his suggestions are different from those I made in my paper, but that does not make it a law that there shall be no extraction whatever, no matter what the conditions or where the teeth are. I have extracted teeth that never saw daylight until I took them out. I have extracted some that were wrong end to, to use a familiar expression, and I did that not more than six weeks ago. The crown was where the root should have

been. If, in a case of regulation, we find such an inverted tooth, we should, in my opinion, use the forceps—that is where we need "forcepitis." We should be prepared to do this work of orthodontia, when a patient who needs it presents. I want to take exception to the statement that extraction should be absolutely condemned at all times.

Dr. J. P. Corley, Greensboro, Ala. I have had the misfortune of being *in*flicted with "forcepitis," as my face shows, and I also have had to go to the rhinologist to have a part of a deflected septum removed in consequence of that "forcepitis." I should therefore feel like having my tongue cut out if I kept my seat when such an issue is at stake. I have for years claimed that only the complete denture will maintain a perfect facial balance and produce perfect nasal fossæ and environment, and have during the past winter submitted this proposition to fifteen dental schools in this country, asking them to adopt in the societies a resolution that they educate their students to the necessity of avoiding these sequelæ of extraction performed in patients under twenty years of age. I hope that Dr. Skeen will live to see the day when he will regret that he made his statement of this evening. He has a well-balanced face, and is a good-looking man, and can afford to speak that way, but I cannot. I have been laughed to scorn in my own society and in this society for making these statements, but I hope to see the time when men like the essayist present data proving to any reasonable man that teeth were never meant to be extracted from the human or any other mouth.

Dr. Skeen. I am surprised at Dr. Corley's taking the floor and trying to make this assembly believe that the forceps had anything to do with inflicting his physiognomy on him.

The following papers were read by title:

Orthodontia.

By E. A. BOGUE.

This paper is intended only as a guide-post for the younger, less experienced practitioners, who may be just starting out as orthodontists, and to whom I hope it may be of some slight assistance.

REQUIREMENTS FOR THE STUDY OF ORTHODONTIA.

Orthodontia must be learned little by little, like a foreign language.

(1) *Normal occlusion.* The operator should have a knowledge of the normal occlusion of human teeth in the adult. The most accurate description of adult occlusion, though difficult to understand, is contained in a paper by Dr. I. B. Davenport of Paris, published in the *Dental Cosmos* for July 1887. Illustrations of occlusion may be found in Angle's "Malocclusion of the Teeth," 6th edition; in Turner's "American Text-book of Prosthetic Dentistry;" also in Pullen's chapter on Orthodontia, included in Johnson's "Text-book of Operative Dentistry."

(2) *Normal arches.* He should have a knowledge of the shapes and sizes of the ideal arches in adults. A treatise on this subject will be found in Bonwill's paper in the "American System of Dentistry," page 406, vol. ii, and in a paper by Dr. C. A. Hawley on "The Determination of the Normal Arch, and its Application to Orthodontia," published in the *Dental Cosmos* for May 1905.

(3) *Irregularities of the deciduous teeth.* He should have an idea of the positions and occlusion of the deciduous teeth at four years of age. Dr. Pullen's paper in Johnson's "Operative Dentistry" furnishes a few illustrations. Dr. Varney E. Barnes' paper on "The Evidence and Significance of Tooth Eruption," published in *Items of Interest* for September 1909, and a few more occasional articles published in dental journals furnish some others, but so far as I know, extensive illustrations of the positions of both normal and abnormal deciduous teeth are lacking. Something is to be learned by observation of the various children that may be accessible. The correction of impending irregularities by means of the deciduous teeth when the child is not more than five or six years of age is the most important factor in modern orthodontia.

It may not be generally realized that the deciduous teeth, at about the fifth year, bear marks of irregularities, if any exist among them, just as distinctly as the permanent teeth. If it is recognized that there is not room for the permanent teeth to erupt regularly, the temporary arches may be broadened sufficiently to admit of such regular eruption; and as they are broadened, the upper molars, having three roots, holding in their midst the crypts of the permanent bicuspids, carry with them these permanent crowns, that have as yet no roots, to the place designed by nature for them to erupt in.

The six anterior teeth and their sockets will then be spread apart and pushed forward, and the arches be enlarged by the operation of the tongue. This process operates to prevent not only many of the irregularities prevalent among the permanent teeth, but irregularities in the nasal cavity and in the parts beyond, and has an important influence upon the cranial development of the child.

(4) *Eruption of the permanent teeth.* Before beginning any orthodontic work the operator should have a clear idea of the changes that should take place in the deciduous dentures at the fifth, sixth, seventh, eighth, and tenth years of age, and of the changes among the permanent teeth at those ages, both in normal and abnormal conditions. This knowledge serves to guide the operator in managing the eruption of the permanent teeth so as to *prevent* irregularity.

The most important teeth in the permanent set are the first permanent or principal molars, which appear while the deciduous teeth are still in the mouth, at about the sixth year of the child's life. The lower principal molars have five cusps, and no other teeth in the human mouth have that number. The extra or fifth cusp on each lower molar stands forward of the upper molar when the teeth are closed, and makes up for the difference in width between the upper and lower incisors, so that with this cusp closing in front of the upper molar, there is just enough tooth substance to form the perfect lower arch with the four narrow lower incisors occluding beneath and inside the arch of the upper teeth. The upper first molar, therefore, sits astride the buccal row of cusps of the lower first molar, just posterior to, and nicely

fitting in with the anterior buccal cusp of the lower first molar. When this arrangement is perfectly understood, as well as the manner in which the various cusps of the teeth occlude with their corresponding sulci or depressions in the antagonizing teeth, one has the groundwork of orthodontia, and not until then. When one understands the changes that take place in the deciduous teeth of a healthy normal child at about five years of age, it is seen that the deciduous incisors and canines should normally spread apart at that age, and thus give room for the eruption of the larger permanent teeth, which lie immediately behind them, above or below, as the case may be. If they do not thus spread apart and make room, it is the province of the skilful dentist who is caring for these children to place upon the deciduous molars light bands with lingual wires, and small vertical tubes fitted to carry an 18-gage arch wire as directed by Dr. Ainsworth (see *International Dental Journal* for July 1904), and to spread these arches until there is room for the permanent teeth to erupt. The fixtures can be allowed to remain a year or two, if necessary, and the regular eruption of the permanent teeth will be greatly facilitated thereby, and all this at very slight cost of money, time, or pain to the patient or his family.

(5) *Means of regulating teeth.* The operator should have an idea of the best means of applying force to irregularly placed teeth to induct them into the places they should occupy.

(6) *Grave consequences of faulty regulation.* He should apprehend the injury that supervenes when any error is made in applying that force, either in the method of application, the amount of force employed, or the time of its application as regards age or condition of the patient.

(7) *Retention.* He should learn what the forces are that retain normal teeth in their normal positions; then learn how, by utilizing the shapes and forms of the teeth, to retain them with the least possible injury in the new positions to which they may have been brought. (See Dr. F. L. Stanton's article on "The Teeth in Respiration" in the *Dental Digest* for April 1910.)

(8) *Certainty of aim.* He should know what he wishes to accomplish and then do it—not do at it.

(9) *Necessity for preliminary treatment of the teeth.* Finally, the operator should make sure that every cavity or defective spot in the enamel of every tooth is carefully and accurately filled or otherwise protected before any appliances are placed upon the teeth. In cases of superficial caries at the gingival margins, especially on deciduous teeth, the writer has found the application of silver nitrate effectual. Otherwise the accusation may justly be brought that the regulation of the teeth has worked more injury than benefit; and he should never extract a permanent tooth in a child no matter what the deformity, involving the teeth only—or it may be his misfortune to have such a letter as the following written about his work. This letter came to me years after I had lost sight of the patient:

"BOSTON, MASS., July 30, 1908.

Dear Dr. Bogue,—Almost fifteen years ago I came to you in regard to my teeth. I had a very narrow arch, and the teeth were irregular and protruding, and my articulation was very indistinct.

After being with you for a year or two, my arch was very much broadened; then I was obliged to move to a western city, and under your direction was treated by a den-

tist in that city. I was under his care for almost two years, and in that time he extracted two teeth.

Now I find the arch is getting narrow—in fact, almost as it was in the beginning, with the exception of the protruding and irregularity. As the arch grows narrow the articulation becomes more indistinct.

I write you this letter thinking you might be interested in the final outcome of the case.

Respectfully yours,

D. F. B.

To which I replied as follows:

July 31, 1908.

My dear Mrs. B.,—I am more grateful than I care to express for your letter received this morning.

As a little girl I took a very deep interest in your case and earnestly strove to correct the difficulty.

When you went away, naturally I could not direct how the treatment should be further conducted.

The extraction that was resorted to was, as you know, against my wishes and against my judgment.

Your case has been published to show how wrong I was in desiring to save all your teeth!—hence you may imagine how pleased I am that you should have written what fully sustains my view, and will perhaps save some other unfortunate from a similar mutilation.

We all learn as time goes by, and I think the gentleman who treated you is by this time convinced that I was right in desiring to give you the fullest width allowed by preserving all the teeth.

Sincerely yours,

E. A. Bogue.

CONCLUSION.

To sum it all up, unless the operator can see the end from the beginning, and have the work clearly formulated, at least mentally, he had better spend more time in studying his case before he does anything, and so avoid the necessity of doing the same work twice.

The Duty of the General Practitioner Toward Cases of Orthodontia which Occur in His Practice.

By HARRY E. KELSEY.

While this subject has not been entirely neglected in the recent literature of the profession, it yet seems worthy of a further brief consideration, and I therefore invite your attention to the following remarks:

THE PRACTITIONER'S DUTY IN CASES OF ABNORMALITIES.

It will certainly be granted by everyone that all abnormal conditions of the body are unfortunate, and demand the sympathy and conscientious aid of those who profess to treat them. Furthermore, it is clearly the duty of these to call attention to impending abnormalitics, and this is a responsibility which both doctor and patient are beginning to recognize more fully. There is scarcely a more prevalent or distressing class of abnormalities than the various malocclusions of the teeth, with the attending malformations of the dental arches and adjacent structures. It is bad enough when merely the health or bodily comfort of the sufferer is involved, but in these cases there are added the unsightly and often repulsive distortions of the

features with which we are only too familiar.

Knowing with what certainty these conditions may be prevented from developing in the adult by early and intelligent advice and treatment, the severest censure is due those practitioners whom the public depend upon for advice if they fail to give it at the proper time, or if what they give is not correct and such as may, if followed, produce worse conditions than already exist. That antiquated ideas and methods are still adhered to and made the basis of advice and treatment by many general practitioners cannot be denied, as we are constantly brought face to face—in a very literal sense—with the results of it, and it is equally true that no one is so likely to have an opportunity to observe at an early age impending malocclusions as is the general practitioner of dentistry. Upon him, therefore, devolves a responsibility which it is his duty to be prepared to meet to the best of his ability.

THE CITY VS. THE COUNTRY PRACTITIONER.

In relation to this subject the general practitioners may be divided into two classes: those practicing in the larger cities, whose patients have access to the orthodontia specialist, and those practicing in the smaller towns or the country, whose patients have not, as a rule, the opportunity of either consultation or treatment by a specialist. Manifestly it is the duty of both to be prepared to recognize conditions which require treatment, but the country practitioner will be in most cases called upon to give the treatment, while he who is located where there is a specialist may end his responsibility by sending his patient to him.

DIFFICULTIES IN COMBINING GENERAL AND ORTHODONTIA PRACTICE.

As an orthodontia specialist and teacher of orthodontia in a dental college, I naturally feel it my duty each year to instruct the students who come under my teaching as to the advisability of attempting to treat cases of orthodontia, and it has been my custom to recommend those who expect to be near a specialist to send their cases to him, for, apart from personal interest, I believe from some years' experience in trying to do both general practice and orthodontia that both my patients and myself suffered as a consequence—and I do not mean merely the orthodontia patients but the others as well, for when our efforts are too greatly divided we surely cannot do either ourselves or our patients justice.

NECESSITY OF ORTHODONTIA TRAINING FOR THE COUNTRY PRACTITIONER.

On the other hand, those who expect to practice in the smaller towns or the country I advise to give more of their time and attention to the technical as well as to the theoretical side of the subject, not only during their college course but afterward, for they are almost compelled to do some of this work, and though they may not be able to give as efficient service as the specialist who can devote all his time and energy to it, yet they can by advice and judicious treatment, together with a recognition of their limitations and the demands of other classes of patients upon them, do much good, and avoid doing harm if they are properly grounded in the basic principles of occlusion and the structural changes that take place in the dental apparatus as a whole during and subsequent to treatment.

NECESSARY RANGE OF THE STUDENT'S TRAINING IN ORTHODONTIA.

The time of the dental student of today is too much occupied with many subjects to enable him to become a specialist in any, even were his mind prepared for the deeper study necessary and the broader application of that study. The riper judgment which will be productive of the highest attainments in any one branch is only acquired by special study, practice, and experience.

What is possible, however, for the student to acquire while at college is a thorough knowledge of the basic principles underlying this subject, which will fit him to give at least safe advice, and, with earnest thought and application, beneficial services if required of him.

To begin with, he should acquire such a perfect familiarity with normal occlusion and the forces governing it as will enable him to recognize it immediately or to note deviations from it; next a thorough understanding of and familiarity with the Angle classification of malocclusions—and understanding and familiarity are equally essential; then a knowledge of bone development, resorption, and rebuilding, and in the light of this knowledge, a close study of the etiology of malocclusions, together with the evils resulting from mutilations occurring as the result of extractions or accidental loss of teeth; finally, as much practical experience in the movement and retention of teeth as other claims upon his time will allow.

Until within a few years such a preparation was not to be had in dental colleges or elsewhere, because the truth upon which it is based had not been discovered.

With the advent of the Angle classification of malocclusions all was changed, however. It was not an intricate method or system invented but a truth discovered by an earnest seeker, and upon it as a foundation he built the framework of modern orthodontia. It has been embellished by other able men, but no one has been able to change the original truth contained in his discoveries, because truth, like the elements, is unalterable.

What the student may learn in the dental college today, the practitioner who is unfamiliar with it should also learn out of college, that he may be able to give intelligent and beneficial advice to his patients; and it is furthermore the belief of the writer that the general practitioner of medicine, and especially the rhinologist, should acquire a knowledge of the fundamental principles of this subject, that he may be able to advise treatment when it is needed.

CONCLUSIONS.

It would seem, then, if the foregoing considerations be true, that the general practitioner, if actuated by concern for the patient's interest as well as his own, would find it wise to refer orthodontia patients to the specialist where it is possible to do so; but, on the other hand, he should not fail to recognize that when this is not possible, it becomes his duty not only to be prepared to give such advice as may prove preventive, but to give intelligent aid, so far as other claims upon his time will permit, when abnormal conditions are already established.

The Necessity of Early Correction of Malocclusion.

By W. E. WILSON.

Any close observer of the current dental literature will no doubt think a paper on this subject to be unnecessary and superfluous because of the already published exhaustive papers on this phase of our work, but the extreme need of reminding the men in general practice that in order to obtain the best results orthodontia treatment must be started at an early age—just as soon as the deformity is first noticed—has been brought to the writer's attention repeatedly, and so forcibly of late that it seems impossible to refrain from expressing an opinion on this vital question, and to re-state some of the established facts which have been already proved in the experiences of the older men engaged in the practice of orthodontia. If what is brought out in this paper or in the discussion later clears up any doubt existing in the mind of but one present as to the necessity of early correction of malocclusion, the time will certainly have been well spent.

RECOGNIZED NECESSITY OF EARLY TREATMENT.

But a few years ago it was common practice among the general practitioners of dentistry to tell the parent inquiring on behalf of his child's irregular teeth that it was of no use to attempt the treatment of any irregularity of the teeth until the child was thirteen or fourteen years of age, meaning, of course, that the malocclusion could not be treated successfully until the permanent teeth, with the exception of the third molars, were fully erupted. Any such practice today has no excuse, owing to the unquestionable records accessible in any library of dental literature, while even the current periodicals handling general subjects have, in the last few years, been touching upon the necessity of correcting abnormal habits, such as mouth-breathing, etc., which we dentists and orthodontists know go hand in hand with irregular teeth.

Today, the earlier we can begin our treatment of malocclusion the happier we are, and the better are the chances for success; for we have come to know that we are not dealing with a case of crooked teeth only, but that malocclusion is only a symptom of a far more serious condition, namely, the lack of development of bone tissue, resulting in the necessity of the teeth buckling or lapping over one another in order to erupt. If, therefore, there is already a lack of development of bone, no time should be lost in righting this condition. And this seems an opportune time to say that the treatment indicated is not extraction, which would only intensify the abnormal and deformed condition already present, but on the contrary, every effort should be put forth to restore normal conditions—in the words of Dr. Angle, "to place each tooth into harmony with the line of occlusion," this being the only justifiable treatment. It is not the purpose of this paper to discuss any special kind of

treatment of any special type of malocclusion, but rather to impress upon the members of the profession who have the custody of the little children during the eruption of the permanent teeth, especially from the age of five to twelve, the responsibility which they cannot escape and remain ethical practitioners of dentistry in the highest sense of the term.

PROPHYLAXIS THE SLOGAN OF ORTHODONTIA.

Prophylaxis, the prevention of disease, stands pre-eminent, head and shoulders above the curing of disease; this applies to orthodontia as well as to any other field. We have come to know that it is a much higher calling to prevent disease than to cure it; better to prevent lack of development of bone than to attempt to make the bone in any particular locality compensate in three or four years for any deficiency in development. Prophylactic orthodontia is a higher calling, because it is nearer the ideal arrangement of things, and the process of treatment is easier for the patient and the success of retention more certain.

DEVELOPMENT OF THE MAXILLARY PORTION OF THE FACE.

In the process of development of the face of the very young child it will be recalled that the text-books teach that the maxillary portion of the face develops forward. To quote from an authoritative paper on dental histology and embryology by Dr. Frederick B. Noyes of Chicago, which he read before the American Society of Orthodontists at Buffalo in December 1903: "The development of the face and the changing expression from the child to the adult is accompanied by the development of the jaws and alveolar processes and a movement downward and forward of the upper incisors, upward and forward in the lower incisors; the change is in the lower portion of the face, increasing the length of the nose, lips, and chin."

To quote from the last edition of Dr. Angle's "Treatment of Malocclusion of the Teeth," page 91: "Coincident with the growth of the jaws the deciduous teeth are carried forward, and the normal mesio-distal lengthening of the alveolar process takes place. If, however, one of the buccal deciduous teeth be prematurely lost, as, for example, the lower first molar, the wedging influence of the erupting first permanent molar will be felt only distally to the lost tooth, and instead of the normal lengthening of the lateral half of this arch through the pushing forward of all the teeth, the second deciduous molar only will be pushed forward to occupy a portion of the space left vacant by the first deciduous molar. Thus this lateral half of the dental arch will be shorter than normal; and if, meanwhile, no teeth have been lost on the same side of the opposing arch, the wedging force from the erupting upper permanent molar will have carried forward the deciduous teeth and lengthened the arch normally, whereupon there will be inequality in the length of the lateral halves of the arches on the affected side, with the establishment of malocclusion."

STUDY OF NORMAL OCCLUSION IMPERATIVE.

Is it not plain, then, that the time to assist the development of this very important region of the facial bones is when it is in the height of its development, and not to wait until all the

permanent teeth are erupted—for, as must be recognized by this time, all the facial features are so substantially formed that complete eradication of all evidences of the facial deformity due to the malocclusion is rarely accomplished, while had corrective treatment been instituted during the process of development of the maxillary bones and contiguous tissues, such results would have been prevented. This admitted, it only remains to prove that it is possible to diagnose a lack of room for the permanent teeth prior to their appearance through the gum. To do this we must keep in mind that the way to detect abnormalities in their incipient stage or in any subtle form is to have a perfect picture of what constitutes normality.

At the offset, let us recall that the bank clerk does not study the counterfeit coin to develop the faculty of distinguishing such from the genuine; but rather he studies the perfect until any deviation from the perfect at once jars his sense of perfection. And to make practical application of this example let us study a normal denture. Each tooth occupies its own normal position in its respective arch, and the occlusion indicates perfect mesio-distal relation. In a normal deciduous denture at the age of five and one-half years, two conspicuous landmarks at once tell of the normal and perfect development of both maxilla and mandible—first, the normal mesio-distal relation of the molars, and second, the interdental spaces from first molar to first molar on both upper and lower arches, insuring plenty of room for the permanent successors, the absence of which room would indicate future trouble.

Mental pictures of both the deciduous as well as the permanent dentures in perfect occlusion, as demonstrated, must ever be kept in the mind of the man who would hope to become competent to detect malocclusion in its incipient stages. Just as the sculptor turns repeatedly to his perfect model in order to re-establish his mental picture, so must the dentist and orthodontist turn from the expression of malocclusion constantly passing before him, and see occlusion in its normal or perfect state.

The Psychology of the Tool-Using Faculty.

By ALTON HOWARD THOMPSON.

"The human hand was forged from the fin of a fish by the human brain."—HUDSON MAXIM.

IN a profession where so much depends upon the efficient application of scientific discoveries to practical uses in the service of humanity, the skill of the hand in the use of tools is of paramount importance. By this skill we maintain our position and efficiency as ministers to human suffering. It is therefore important that we should have a scientific knowledge of the tool-using faculty, to the end that we may be the better able to fulfil the demands made upon us in that service. Let us therefore go back to nature, the primary basis of all things, and endeavor to discover and trace, if we can, in a feeble way, the origin and evolution of this faculty. It is a long story, so we cannot go into much detail.

and will only touch upon the salient points; but even these will throw a flood of light upon a subject which is fraught with interest to us as dentists.

RATIONAL USE OF TOOLS AND WEAPONS BY ANIMALS DISCLAIMED.

Nature, with her ever-provident generosity, has endowed many animals with the power and means for reducing material substances for food and other purposes. The means whereby this is done are usually specially developed organs of the body, which have been modified by use and evolution. Thus the teeth were specially developed for food reduction primarily, and thence, in some instances, as secondary organs to serve as tools and weapons, as, for example, the canines of the carnivora, the chisel-shaped incisors of the rodents, the tusks of the elephant and walrus, etc. Other parts and organs are specially developed as tools and weapons also, as the tail of the beaver, the forceps of the lobster, the horns of the ungulates, etc.; thus there are many instances of the special development of organs which are parts of the organism and attached to it. But we are now considering the use of extraneous substances as tools and weapons, which is rare among animals. This operation is quite beyond the psychic capacity of most animals in their native state, and training by man is of course ruled out. There are, however, a few curious instances, as that of a little female yellow-jacket which uses a small pebble to pound down the earth of her nest; but such instances are rare among lower forms. Many stories are told of the use of clubs and stones by higher animals, especially the quadrumana, which must be taken with allowance, for travelers are much given to exaggeration. Many animals seize objects that can be grasped by various organs of prehension, but such actions are mainly automatic, instinctive, and irrational. We have been told by many travelers that apes and monkeys employ clubs as weapons, stones and nuts as missiles, etc.

In order to make definite investigation of the subject, the writer addressed the keepers of the quadrumana in various zoölogical gardens in order to ascertain what they had observed as to the original and uninstructed use of external objects as tools and weapons. The keeper at the zoölogical garden at Philadelphia courteously replied: "The whole subject of the psychology of the lower animals, to which your letter refers, is one on which trustworthy evidence is very scarce. Personally, in twenty years of observation of wild animals, I have never seen a case of the application of such means to such ends as that of stones for tools and weapons on the part of a monkey which could be believed to show conception of purpose. I am inclined to think the recorded cases largely accidental or the result of misconception or imagination."

Dr. Frank Baker of the National Zoölogical Park at Washington, writes: "One monkey in our collection, when annoyed by visitors, will throw anything from a feed-pan to a handful of sawdust at the offender. One cebus tries to pick cockroaches out of the cracks of the floor with a straw when too small for his fingers. Beyond that, there has been nothing observed that could be considered as the using of an object as a tool or weapon." Other correspondents gave the same testimony, that no actions had been observed on the part of the quadrumana that could be taken as indicative of an intelligent plan in the use of

tools. In his book on "The Speech of Apes and Monkeys," Prof. R. A. Garner, who spent some time in the wild country of the Gaboon on purpose to pursue his studies, says that "animals may be taught to do many things in a mechanical way without motives that relate to the actions." His pet chimpanzee tried to drive nails, use the saw, and perform other simple actions, but could not do them, nor even the simple striking with a club to crush his sugar-cane. Of the gorilla he says: "As to his throwing sticks or stones at his enemies, there is nothing to verify it and much to contradict it. Neither the chimpanzee nor the gorilla close the hand to strike, or use any weapons but the hands and teeth." Mr. Chas. Morris says in his book "Man and his Ancestor": "The species of quadrumana that use missiles fail to take aim, for two reasons. One is, the only occasional employment of the faculty, in imitation of human actions, and the other is that their arms are ill suited for this action from their different adaptation to locomotion in climbing and swinging in trees." From all the evidence thus acquired, we must conclude that the use of extraneous substances by animals, especially the quadrumana, is purely imitative and automatic, and is not to be considered as rational at all.

MAN'S USE OF TOOLS AND PSYCHIC EMERGENCE COINCIDENT.

We must conclude further that the use of tools and weapons, even preceding their artificial conformation for definite purposes, marked the time of the differentiation of the primitive man-ape from the animal branch, and accompanied—indeed, was the cause of—the psychic emergence. The moment that the forerunner of man employed extraneous objects intelligently with a purpose as tools and weapons, he ceased to be an ape and became a man. We must believe that the first use of tools and the psychic emergence were coincident and interdependent. As Morris again says (*op. cit.*): "The habit of using implements is one of supreme importance in animal evolution. To it we owe man as he exists today. While animals confined themselves to their natural weapons of teeth and claws, their development must have remained a very slow one, and have been confined within very narrow limits. When once they began to add to their natural powers those of surrounding nature by the use of artificial weapons, the first step in a new and illimitable evolution was taken. From that day to this man has been occupied in unfolding this method, and has advanced enormously beyond his primal state. A crude and simple use of weapons gave him in time supremacy over lower animals, and an advanced use of external substances has given him supremacy over nature herself."

MAN'S EVOLUTION AS DUE TO TERRESTRIAL HABITS AND OMNIVOROUS DIET.

The struggles of the first man-ape to maintain his existence amid the hostile surroundings in which he found himself are fraught with peculiar interest, and are even pathetic when we consider the odds which were against him in the fight. He well employed what gifts nature had bestowed upon him with such skill as he possessed, and by the cultivation of that skill made of himself a new being. His own natural weapons of teeth and claws were being rapidly re-

duced, and would needs soon have brought about his extermination but for the development of the grasping powers of the hand, which enabled him to employ the extra-natural resources around him. These natural weapons came in opportunely to supplement his own waning powers. The reduction of the jaws, teeth, and claws were a correlative variation due to the assumption of the prehensile function by the hands and the attaining of the erect attitude. From the primitive arboreal prototype it is probable that the later ancestor of man descended to the earth, and became semi-terrestrial in habit, like the anthropoid apes of today. But the grasping power of the hand still remained and was developed for other purposes than climbing, and with its growth the seizing and prehensile functions of the jaws and teeth were superseded, and thus became useless. These parts were correspondingly reduced according to nature's well-known law of economy of growth. For, as Darwin well says in his "Descent of Man": "As man gradually became erect and continually used his arms and hands for fighting with sticks and stones, as well as for other purposes of life, he used his teeth and jaws less and less. The jaws, together with their muscles, were then reduced through disuse, as well as the teeth through the principles of correlation and economy of growth." This law of correlation is one of the most wonderful chapters of human evolution. The teeth and jaws of man are of such embryonic form today that some other influence must have supervened to have accomplished their reduction aside from mere food reduction and disuse. This power in man's primitive ancestral type was undoubtedly the developing of the grasping power of the hand and its usurpation of the prehensile function. While the ancestral form of man became gradually adapted to terrestrial locomotion, he retained the erect attitude, and thus the upper limbs were left free to be employed for other purposes than arboreal locomotion. As Chas. Morris again says (*op. cit.*): "The organization of man renders it questionable if his immediate ancestor was arboreal to the extent of the monkeys and lemurs. He probably made the ground his habitual habitat at an early period in his history, and the result of his new habit was a change in the relative length of the arms. Unlike the kangaroo, the extinct dinosaur, and other animals that have learned locomotion on the hind legs alone, the front limbs were not excessively reduced in man, for the reason that they were gradually diverted to the performance of other duties, and were kept employed. It is also quite probable that the man-ape at an early day became omnivorous in his diet by adding flesh food to his fruits and nuts, and this would demand more active employment of his hands and arms in the capture of prey. This necessary activity did not fail to modify to a great degree the use of the arms, and interfere with their utility in locomotion, so that more liberty would be necessary to render them effective. The acquisition of these two new habits of life, *i.e.* descent to the ground and the addition of carnivorous food to his dietary, contributed largely to the evolution of the faculty of employing clubs and stones for striking and throwing, rendering man's ancestor thereby better able to survive in the struggle for existence, and was the first cause of his subsequent marvelous evolution. He could

not only fight better, but he could procure food more easily, and thus much was contributed to the solution of the two greatest problems of primeval life. How long ago it was that early man left the trees and made his home upon the ground, it is impossible to say. It may have been as far back as the early pliocene or the late miocene period, or even earlier, but in his new habitat man was exposed to novel conditions that must have exerted a stimulating influence upon his mind. Such a new series of duties exerted a vigorous influence upon the brain, already quick of thought and susceptible to fresh impressions. The man-ape entered upon a new and rapid phase of mental progress, his brain developing in power and growing in dimensions as it slowly became adapted to its new situation and grew able to cope with fresh demands and critical emergencies."

EVOLUTION OF MAN'S THINKING POWERS COINCIDENT WITH THE INCREASE OF MANUAL SKILL.

The important consideration is, that in connection with the evolution of the grasping powers of the hand, as primitive man learned to use clubs and stones as tools and weapons, and came to aspire and attempt more precision and skill in their use, these efforts taught him to think. It was this important step in his evolution that marked the era of man's psychic emergence from the animal kingdom and his emancipation from the thraldom of mere animal mentality. The awakening of the consciousness of a desire for greater precision in the use of the hand acted as a stimulus on the nerve centers controlling motion, and these centers became enlarged by reason of the efforts put forth to accomplish the desire. It produced the difference between the mere animal with his automatic brain, and the predestined thinking man. The vital spark that first lit up the animal mind of the ancestral man-ape acted as a stimulus on the nerve substance, and it grew, and as it grew he thought more, and as he thought the more his brain grew, and he became a man. As Prof. J. D. Cunningham has well said (Proceedings of the British Science Association, 1901): "In man certain portions of the cerebral cortex have been greatly enlarged, and there is no corresponding enlargement in the simian brain. It is not difficult to account for this important expansion of the cerebral surfaces. In the forepart of the region involved are placed the groups of motor centers which control the muscular movements of the more important parts of the body. Within this are the centers for the arm and hand. In man these have undoubtedly undergone marked expansion. The skilled movements of the hand, as shown in the use of tools, have not been acquired without a corresponding increase in the brain mechanism by which they were guided. So important, indeed, is the part played by the human hand as an agent of the mind, and so perfectly is it adjusted with reference to this office, that there are many who think that the first great start which man obtained on the path which has led to his higher development was given by setting his upper limb free from the duty of acting as an organ of support and locomotion, and the assumption of the different duties of prehension and precision in the use of extraneous objects

as a resource for the purposes of life." Thus the brain received a stimulus by the dawning of the idea of using the hands, with the consequent reactions in both directions, *i.e.* the increase of manual skill and the evolution of thinking power. The manual concept reacts upon the mental concept, and the stimulus is mutual and retro-active. This mutual effect is well understood and utilized in special fields of training for the muscles and the brain. In dealing with criminals, defectives, and incapables in reformatories and special institutions for the defective classes, it is a well-known fact that the training of the muscles and the manual powers is the first step in the process of arousing the dormant powers of the mind. The results of this method have been simply marvelous, as all who are engaged in the work of reclaiming defectives can attest. As Dr. E. S. Talbot in his book on "Degeneracy" says, "Manual training is a principle long adopted in idiot schools, where the training of certain muscles through both mental and physical methods precedes intellectual training alone." Manual training in the common schools is now looked upon—and the results well attest its value—as a desirable, if not necessary adjunct in the work of the awakening and developing, not only the physical powers but also the mental life of the children. Its effects upon the dullards is like an inspiration. The reflex effect of manual effort, of the consciousness of manual precision upon the brain is well understood wherever displayed. This effect, we are bound to believe, was the potent power that awakened the mind of primitive man, and his psychic emergence was due to that awakening. From that moment he ceased to be mere animal and became man.

THE ARTIFICIAL SHAPING OF NATURAL SUBSTANCES INTO TOOLS AND WEAPONS, AS COMPLETING MAN'S EVOLUTION.

The next important step in his evolution was the additional spark of intelligence that suggested the artificial modification of natural substances as tools and weapons to better adapt them to his wants. The first conception that a pointed stick was better than a blunt one, which great fact suggested the possibility of shaping the stick by hand, was a forward step of the greatest possible importance. When man discovered by accident that flint chips could be made by hand, he thus placed in his grasp the invaluable stone knife, which, with its subsequent modifications, opened up a vast field of resources and added to the food supply and even to the comforts of life. The very first step in the direction of the modification of natural products indicated his complete emergence from the animal stage. From this point on his mental evolution was rapid. From the sharpened stick he advanced to its hardening in the fire, then he attached to it still harder points of stone and bone, and from this was developed the highly effective spear and arrow. From the pounding-stone was developed the sharpened and grooved ax, with its many modifications, and the subsequent attaching of a handle to it marked a notable step in intelligence. As a missile the stone did not undergo as great an evolution as the hammer in early savage life, but in modern warfare the missile has become the most important and effective weapon.

THE TOOL-USING FACULTY THE MAIN FACTOR IN HUMAN EVOLUTION.

The further development of the tool-using faculty indicates the path of the rapid evolution of the mental powers that has been the salvation of the race. From primitive times the tool sense has been the power that dictated mental evolution. It is the faculty that prompted the marvelous industrial development of the last century. It is the keynote of our civilization. Coincidently, there has been developed a power of ratiocination in the mind of modern man in all directions, both abstract and concrete, that owes its origin to the tool-using sense. With all our pride of mind, we must not forget our humble beginnings in this, as in other branches of human evolution, and the slow progress along the pathway of long mental training by which our mental superiority has been brought about, and our dominion over the rest of the animal world has been made secure. The establishment of that dominion preceded our conquest of nature and the enslavement of her powers, which was the direct result of the evolution of the tool-using sense. By reason of this wonderful development, man may well say with Descartes:

"Cogito, ergo sum"—I think, therefore I am.

Incidents in the Practice of an Oral Surgeon.

By TRUMAN W. BROPHY.

A SUBJECT which will always demand the attention of the dentist, and one with which he must become familiar, is *pain*. Pain originates from many different causes; to be able to recognize the sources of pain is one of the most important considerations in making a diagnosis.

DIFFICULTY OF DIAGNOSIS IN REFLEX PAIN.

Frequently in cases of pulpitis the pain is located by the patient in some part quite remote from the center of disturbance. Not infrequently pain from an exposed dental pulp will manifest itself in the supra-orbital branch of the fifth nerve above the eye, or it may be transmitted to the inferior dental branch, and seem to be localized in the mental foramen. Pain that has originated in other parts of the body may sometimes manifest itself in the different branches of the fifth nerve and impress the patient that the teeth are responsible, when close examination reveals no dental lesions and nothing that would lead the examiner to locate the pain there; so pain may have its origin from a source that is extremely obscure, and thus may baffle the highest skill in making a diagnosis.

It is necessary for me to state that the chief causes of such pain as is presented for treatment to dentists are pulpitis, pericementitis, results of infections which terminate in dento-alveolar abscesses, periostitis, excementosis, the presence of pulp-nodules within the root-canals, imperfectly adjusted artificial dentures, crowded arches, impacted teeth, and some others of minor origin.

To make a diagnosis of almost all of

these conditions is comparatively easy, but in making a diagnosis of neuralgia which may have its origin from some of the conditions just named, complications which are not so easily discovered must often be taken into consideration.

DIAGNOSIS OF TRIGEMINAL NEURALGIA DUE TO DENTAL LESIONS.

Among the most aggravating types of trigeminal neuralgia, the one which causes the patient the greatest distress is that due to dental lesions. A patient appears in the clinic whose teeth have been cared for carefully, no evidence of dental caries being present, no tenderness of the surrounding tissues on percussion of the teeth; yet the patient complains of pain in the region of the first and second lower bicuspids, which teeth on examination are found to be sound. Inquiry is made as to the habits of the patient, his occupation, the question of poisoning from phosphorus, arsenic, lead, etc. These possible factors are eliminated. Further examination reveals a second molar with a dead pulp. We see no cause for acute pain from this tooth; there is no soreness present, and we do not see how this tooth could produce such acute pain. Then we come to the realization that ocular examination, information from the patient, the use of all the means at our command thus far employed, have failed us. We still have another measure which we can employ to assist us in locating the source of the trouble, and that is the skiagraph. If the skiagrapher has done his work thoroughly, we may find at a glance the origin of the pain. It may be a chronic abscess at the apex of a root of the diseased molar, which, as we have mentioned, has discharged directly into the inferior maxillary or dental canal, the pus coming in direct contact with the nerve being the cause of this neuralgic pain. We may find, in the pulp, nodules which by exerting pressure on its nerve filaments might cause the pain. We may find, back near the angle of the jaw, a third molar impacted, directing pressure on the inferior maxillary nerve, thus causing pain.

We may find the upper third molar diverted from its proper position and driven backward through the tuberosity of the jaw, exerting pressure on the posterior dental nerves, thus causing pain. We find supernumerary teeth here and there producing pressure on nerves and becoming sources of pain. There are many causes of nerve-pain in this nerve region aside from that easily seen on examination.

Since diseases of the teeth are more prevalent than any other disease to which mankind is subject, we find many other diseases having their origin in them. Within the domain of the practice of the rhinologist comes chiefly the treatment of diseases of the accessory sinuses to the nose. We realize the remarkable improvement that has been made in the science of medicine during the last quarter-century, and yet those of us who have been trained in the fields of dental and oral pathology are impressed with the fact that errors of diagnosis are not infrequently made by physicians who are called upon to treat diseases in the mouth and about the face which have originated from diseased teeth.

DIAGNOSIS OF DISEASES OF THE ANTRUM OF DENTAL ORIGIN.

One of the most striking examples to prove the truthfulness of the above asser-

tion is found in the treatment of the diseases of the antrum of Highmore. This cavity, by reason of its anatomical relationship to the teeth, and in view of the great number of dental abscesses which occur, becomes infected from these abscesses. I believe 85 per cent. of all cases of empyema of the antrum have originated from dento-alveolar abscesses. The close proximity of the roots of the teeth to the floor of the antrum, the passage of these roots, sometimes, directly into it, being covered only by pericementum and mucous membrane, makes it quite clear to all that in the event of the formation of an abscess at the end or ends of the roots, the pus would surely make its exit into the antrum. This pus becomes a source of irritation to the mucous membrane lining the antrum, and leads to the general breaking down of the walls, or at least of the mucous membrane. A sense of fulness, pressure, headache, general languor—which is due to absorption—and general infections are observed during the acute stage. The passage of pus through the aperture between the antrum and the nose, discharging through the anterior nares or posteriorly into the pharynx, is noticed, and many cases are treated for nasal catarrh.

The rhinologist, in studying the origin of the disease, often does not take the teeth into consideration. Irrigation of the nose is of little value; it will give some temporary comfort in relieving the parts of the secretions, but the source not having been reached, pus will continue to form.

Treatment. A patient who is suspected of having antral abscess may be managed in the making of a diagnosis in this way: Let him lie with the suspected diseased side on the pillow and retain that position as well as he can during the night; in the morning turn the head over quickly, and if the opening between the nose and the antrum has not been closed, a copious flow of pus will at once take place, and this will be convincing that the antrum is diseased. If the head is pushed forward, the pus will escape from the nose. Use the same treatment on the other side, and there will be no flow of pus as before from the antrum, as there is no accumulation. If it be decided that the antrum is diseased and that an abscess exists, providing it is a recent case, a small aperture may be made in the anterior wall and the antrum flushed out by means of a small pointed syringe which may be introduced. This treatment, if given two or three times, will effect a cure. Of course the teeth, if any are diseased and responsible for the abscess, should be treated and cared for as though the abscess had not been formed. They should be treated on general principles, treating the canals and filling them, and retaining the teeth; but if the teeth are of no value, only loose roots being left, these should be extracted.

If an antral abscess becomes chronic, on the antrum walls polypi will have developed, which must be removed. I find that in almost all cases of chronic antral abscess polypi are found. In the event, then, of chronic abscess, the one course to pursue that will make the operator sure of the condition and enable him to effect a cure upon which he can rely is to make a large opening through the anterior antral wall, clear out the polypi, and pack the antrum with gauze, allowing the gauze to remain for forty-eight hours, when it should be removed and the antrum irrigated and examined with a small incandescent light, which will

readily pass in, thus enabling the operator to ascertain the exact condition of the parts. Progressing in this way the operator will be able to treat his patient with a distinct understanding of the condition of the parts and of the progress that is being made from time to time. The opening into the antrum may be maintained by a plug, preferably of gutta-percha shaped so that it will not slip in, by having a flange on the outside. This plug may be removed from time to time and the antrum irrigated. The opening should be large enough to allow of the introduction of a finger, and to afford easy access for the accomplishment of the work required.

CYSTS.

In our clinics there are many patients afflicted with cysts in and about the maxillary bones;—mucous cysts, dentigerous cysts, retention cysts, and ranula being some of the most pronounced types that come before us constantly.

Mucous cyst. A mucous cyst is simple, forming in the mucous membrane, and needs to be opened and freely cauterized. This treatment administered once is generally sufficient to remove the cyst.

Ranula. Ranula or cyst of the salivary ducts conveying the saliva from the submaxillary and sublingual glands, differs from the simple mucous cyst. Ranula is due to stoppage of Wharton's ducts, arresting the passage of saliva from the submaxillary glands. This stoppage of the ducts is due to either the formation of salivary calculus within the duct or to inflammation at the orifice of the duct, which causes adhesion and closure. The pressure of deposits of salivary calculus within the duct may be detected by digital manipulation; if that fails, a skiagraph will show clearly the pencil-shaped deposit in the duct, which stops the passage of the saliva. If the stoppage is due to adhesions, of course no deposits of calcium salts should be observed. A ranula may be simple, having only an accumulation of fluid within it, or it

Fig. 1.

Simple ranula.

may be complicated, accompanied by a neoplasm. The neoplasm is due to the irritation caused by the pressure of fluid against the surrounding walls of the cyst.

A simple ranula, one not attended with a growth surrounding it, should be opened in such a way as to allow the fluid to escape, and the opening must be maintained to avoid a recurrence of the cyst. If a ranula is merely punctured, allowing the fluid to escape, the opening will heal and there will be a recurrence

of the cyst. To establish a permanent opening I have made use of a silver tube with many openings made in it. This is introduced into the sac, passing out at another point, forming a ring by telescoping one end of the tube with the other. The perforated tube-ring allows the saliva to enter the sac and make its exit outside the sac. (See Fig. 1.)

Fig. 2.

Dentigerous cyst.

This also establishes a permanent opening, as the tissues become glazed over with membrane surrounding the ring. After the lapse of about two weeks the tube may be removed, when it is found that these permanent openings will allow the passage of saliva freely.

In the event of a growth accompanying the cyst no other treatment will effect a cure than the thorough removal of the growth with the cyst. This sometimes involves the submaxillary and sublingual glands. If the glands are enlarged to a very great extent, they may have degenerated so that their removal will be necessary.

Dentigerous cysts. Fig. 2 is the photograph of a patient showing quite clearly the conditions prior to the removal of a dentigerous cyst. The boy came to my clinic with his cheek greatly distended, as a result of the formation of this cyst. A skiagraph revealed the presence of the lower right lateral incisor, cuspid, and two bicuspids within this cyst. The external wall of the cyst was completely removed, together with the entire surrounding membrane which formed the wall of the cyst. The cyst contained a great quantity of brown-colored fluid filled with cholesterin. The bone was absorbed to such an extent that it was extremely thin, making the removal of the cyst and contents a risk, as there was danger of fracturing the thin plate of bone remaining. We succeeded, however, in making a satisfactory operation.

A dentigerous cyst, it is unnecessary to state, has as its nucleus one or several teeth. The teeth may be deciduous, permanent, or supernumerary ones. On examination a permanent tooth might be missing. In that event we have something of a clue as to the origin of the cyst, though this is not reliable. If supernumerary teeth are the cause, we have no way of knowing of their presence. The only reliable means at our command to enable us to make an accurate diagnosis is the skiagraph, as by this means we are able to locate exactly the tooth, and it is a matter of importance, oftentimes, to know how many teeth the cyst contains. With this information we are able to make an accurate diagnosis. It is essential to remove every vestige of membrane lining the cyst, else there may

be a center about which the cyst may recur.

Differential diagnosis between a cyst and aneurysm. In making the diagnosis of a cyst it is first necessary to make use of an exploring needle, drawing off some of the fluid to determine its character. In differentiating between a cyst and an aneurysm it is to be noted that an aneurysm is not infrequently developed in the posterior palatine artery in the region of the tuberosity of the jaw. Of course, in an aneurysm there is pulsation, while in a cyst there is none. Nevertheless it is always wise to use an exploring needle before opening any cavity containing fluid.

Oral tumors. It is unnecessary to call attention to the many classes of oral tumors, but only a few of those which are the most prevalent will be mentioned. Those which most frequently come under our observation are the benign tumors known as epulis, and the malignant tumors, carcinoma and sarcoma.

Epulis. Epulis is classed among the benign tumors. At its origin it is unquestionably benign, although it may under certain conditions take on a malignant form, if it has been allowed to develop. It should not be neglected and should not be tolerated, though it does not cause any marked inconvenience to the patient until it has reached considerable size. It is a well-known fact that it has its origin from the periosteum. It extends up between the teeth and around them, separating them, takes on a bright red appearance, and bleeds very readily on the slightest friction. Fig. 3 illustrates the growth appearing between the teeth of a young girl, upward toward the cutting edges.

Error is frequently made by cutting off these edges. Epulis means "upon the gum"—*epi,* "upon" and *ulis,* from *oulon,* "gum." While it seems to be seated on the gum, it has its origin on the periosteum just at the neck of the tooth or teeth, and involves the gum in its growth. It is therefore a tumor of fibrous character. It is most generally to be found anterior to the molar teeth, although it may involve the tissues anywhere back as far as the angle or tuberosity of the jaw. It is not self-curing, and the removal of the portion above the gums will always admit of its recurrence. The only treatment that will effect a cure is the removal of the growth, together with the periosteum from which it originates, with some of the bone underneath it. It is possible to do this sometimes without removing the tooth adjacent to the growth, though in some cases it is necessary to remove the tooth or teeth, as the perice-

Fig. 3.

Epulis.

mentum sometimes is involved in the growth, and no other treatment can be employed that will permanently remove the diseased tissue. As in the development of most tumors, the development of epulis is the result of an irritation.

Carcinoma and sarcoma. It is unnecessary to state that accumulations of salivary calculus, the adjustment of bands to teeth that extend up too far, artificial dentures, etc., may cause irritation at the neck of the teeth sufficient to cause a multiplication of cells.

The prevalence of malignant growths in the mouth is not difficult of explanation. Anything that will produce irritation of the mucous membrane will lead to the multiplication of cells. The multiplication of cells will lead to a growth, and further irritation of the growth will lead to further growth, and so this irritation to which the mouth is so subject by reason of any irritation set up about a tooth is the cause of the development of these tumors in many cases.

AN EDUCATIONAL CAMPAIGN NEEDED.

Really, an educational campaign should be started to teach people how to avoid irritation of the mucous membrane. They do not realize the danger to which they are subject.

From my experience, which extends over many years of private, clinic, and hospital practice, I can state without the slightest hesitancy that nearly all cases of malignant growths can be traced to some irritation which has been neglected. In the largest cities of our country great progress has been made for the last year in devising plans for securing care for the teeth of school children. It has been my duty as chairman of a committee in Chicago to be in conference with the superintendent of the schools and the health commissioner, and to arrange plans by which the 176 schools of Chicago may be supplied with examiners and dentists to care for the worthy poor of Chicago, while the others are urged to apply to the family dentist for the care that they so much need.

The average father and mother do not know the importance of caring for the teeth of children. They do not know the difference between deciduous and temporary teeth. With the work that we have started, the children will be impressed with the importance of having their teeth cared for before they are lost by disease. In this we will succeed to a very great degree, and a large percentage of the cases of trigeminal neuralgia, general infection, formation of tumors, and other diseases of the face will be eliminated by education of the children in regard to the importance of dental care. Furthermore, the question of oral prophylaxis will be so thoroughly impressed upon the people that in a few years' time a marked improvement will be found in the teeth of the youth of Chicago.

We must not forget that any irritation may be the beginning of a malignant growth.

Motion was then made and carried to adjourn until Thursday morning at 9 o'clock.

SECOND DAY—Thursday, May 5th.

THE meeting was called to order at 9.30 o'clock on Thursday morning, May 5th, by the president, Dr. Chace.

The reading of the minutes of the last session was, on motion, dispensed with.

The President announced the appointment of the following committees:

On Necrology—Drs. Guy Morgan, J. W. David, and H. C. Hassell.

On Resolutions on the death of Dr. Crawford—Drs. J. G. Fife, J. T. Meadors, and G. S. Vann.

On Revision of Constitution and By-laws—Drs. B. Holly Smith, A. R. Melendy, and V. E. Turner.

Dr. MASON moved that the papers presented to the association at this meeting and not represented by the authors thereof be read by title and published in the Transactions.

The motion was carried.

The next item on the program was the report of the Committee on Oral Hygiene, by Dr. J. P. CORLEY, chairman, as follows:

Report of Committee on Oral Hygiene.

By J. P. CORLEY, Chairman.

Gentlemen.—The committee appointed to work with your chairman were unable to serve. The selection of a new committee delayed matters so that it was late when we got to work.

Our first move was to hold a committee meeting in New Orleans early in February for the purpose of organizing and mapping out a plan of campaign. The entire committee was present, and all the deliberations during the two days' session were concurred in unanimously.

We reviewed the work of the Committee on Oral Hygiene of the National Dental Association, indorsed it with congratulations to its chairman, and resolved our committee into an auxiliary to the National committee.

We determined to follow the general plan of campaign proposed by the National committee in so far as local conditions and our resources would permit.

Our committee proposed to undertake to establish hygiene headquarters in one representative city in as many of the states in the Southern territory as we could reach during the present administration. To this end the chairman was commissioned to visit these cities and endeavor to get the local societies to undertake the work of organizing their cities after the Cleveland plan. This plan consists in making a dental inspection of all the public schools, delivering a course of lectures in the schools, and establishing and maintaining a free dental

clinic where all the children of the indigent poor who are public school pupils can have free dental service.

We also made out the program for two sessions of the present meeting, an afternoon literary session and an evening public session having been promised by the president.

We indorsed the tooth-powder formula proposed by the National committee, and also its promulgation in such a way that the association would derive a revenue to be used in promoting the cause of oral hygiene.

An appropriation of funds and equipment by the National committee placed at the command of the Southern Branch committee to be used in their campaign was accepted with a resolution of thanks to the chairman of the National committee.

Chairman Corley was assigned work with the "local societies." Committeeman Walker was assigned the "public school" feature. Committeeman Towner was asked to present the preparation of the "dental student," and Committeeman Griffis was requested to study the "state boards' part" in the work of oral hygiene. The time has been short, and our resources have been limited, but we are pleased to report satisfactory progress in all these departments of the great work.

Your chairman has visited six local societies in five of the Southern States, and explained the details of the propaganda. All of these societies enthusiastically indorsed the plan, and recorded their intention of undertaking to put it into practical operation. A conservative opinion at the present time permits of the prophecy that they will all make good.

There is a general awakening in the medical and dental professions to the paramount importance of prophylaxis. In order that humanity may acquire immunity from disease the scientific prophylactician has determined upon a propaganda of popular education. To do this most quickly and economically it must be done through associated effort.

It is our desire to see all hygiene educators in the country associated under the leadership of the Hygiene committee of the National Dental Association. The present administration of that committee has made a showing that will inspire the confidence and secure the co-operation of every association in the country.

It is the intention of the committee to submit at the Denver meeting a plan whereby every section of the country can be efficiently and systematically reached with the gospel of Oral Hygiene. It is the opinion of your chairman, and I think the entire committee, that your committee should be officially declared an auxiliary to the National committee with directions to work under their general instructions.

The proceedings of the National committee have been published from time to time in the journals, and I assume that you are all familiar with the details of their campaign. It is to be hoped that this association will officially indorse their work. The opening of the National Oral Hygiene campaign under the able management of Chairman Ebersole, at committee headquarters in Cleveland, Ohio, in March, was the biggest event that the profession has ever witnessed, and it marks a new era in the practice of dental science.

Your chairman has had the good fortune to have had associated with him three of the ablest men in the Southern Branch territory, and wishes to embrace this opportunity to eulogize their self-

sacrificing devotion to the cause of popular dental education. They are all present, and each has two contributions to the literary program and also something for the clinic.

Your chairman also wishes to thank President Chace for his very generous appropriation of two sessions of the program to the subject of hygiene. His enthusiastic support has also been a substantial encouragement to the committee.

At the close of this evening's session we wish to submit a number of resolutions for your consideration as addenda to this report.

Respectfully submitted,
J. P. CORLEY, *Chairman.*

Dr. CORLEY. It is the desire of the committee that this report and the papers on this subject be read and discussed as a whole.

The first paper was that by Dr. W. M. GRIFFIS, Paris, Texas, entitled "The State Association's Part in the Oral Hygiene Propaganda," as follows:

The State Association's Part in the Oral Hygiene Propaganda.

By W. M. GRIFFIS.

WE are glad to see at this meeting the section on Oral Hygiene given a sufficient and prominent place on the program. There is no subject in connection with the profession of medicine or dentistry that is attracting the attention of the public so much as that of oral hygiene. Not that it is a new subject, but we are beginning to awaken the public mind to the fact that a clean oral cavity and normal healthy teeth are very essential to good health. As a state society we want to shoulder our part of this great work of educating the public in the proper care of the teeth and mouth. Our first efforts along this line began two years ago. A committee was appointed in charge of the work, and we realize that some good has already been done in a small way.

Now that the National Dental Association has more fully outlined the work and better plans have been advanced, we hope to soon accomplish a great deal more. Our state association is thoroughly convinced of the fact that there is a great work to be done, and it has already appropriated some funds for its support in carrying on the work, and will probably contribute much larger sums as they are needed. We are now making the purchase of a sufficient number of lantern slides, which will be useful in giving lectures to the public. We are glad that at this meeting one evening has been set apart for the public, and I hope that it will demonstrate to our body the great benefit of having such lectures in connection with our meeting each year.

We have also a number of wide-awake local dental societies that can assist greatly in this work, and we hope that others will organize. We trust that they will create hygiene committees and appoint some good local practitioner who will frequently use the lantern and the

slides that the state association will furnish upon request for the purpose of such lectures.

In conclusion, I will state that this association means to keep abreast of the times and let its watchword be—"Keep pure the mouth, the gateway of health."

The next paper was that by Dr. JUSTIN D. TOWNER, Memphis, Tenn., entitled, "Preparation of Undergraduates for Teaching Oral Hygiene to Their Patients and the Public."

The report of the Committee on Oral Hygiene and the above papers were discussed together, as follows:

Discussion.

Dr. L. P. ROBERTSON, Marlin, Texas. I do not think it would be wise to take up much time in the discussion of this report and the papers, for the reason that they cover the ground so well that no further discussion is necessary, and besides, we have a great deal of other business to attend to.

This work is certainly a very laudable undertaking, and it is very gratifying to see the interest manifested in it. A very broad field is opened to us, calling for sacrifice and co-operation.

I have only one suggestion to make in regard to this work. Probably some of you will remember the report made by Dr. Thompson, nearly two years ago, at the joint meeting of the Maryland and District of Columbia societies, in which he suggested that this work should be undertaken early in life—that is, we should begin with children early in life, study their environments, and give proper information to the teachers in the schools, colleges, and universities. If we hope to create an interest in this work, it is necessary that we should begin at the beginning.

Although this subject has been agitated for years, we have succeeded in doing very little.

Since it is going to take much of the operator's time and much money, both of which are difficult to secure in the state of Texas at least, I should suggest to have adopted by the state text-book board suitable text-books on physiology to be used in the public and normal schools. That is as far as we have any legal authority to go in this matter. The physiology text-books differ in the teaching of oral hygiene. The physiology books used in the public schools are rather technical, and in the public schools in Texas this work is terminated in about the sixth grade. I would therefore suggest to have committees appointed from the state dental and medical associations to meet jointly and to study and prepare matter for a physiology text-book that we can have adopted by the next board.

The reason why the physiology text-books used in the Texas schools have been so poor is simply because no better ones have been offered to them. The members of the board realize the importance of this subject, and if we will only present a proper book, I feel sure that it would be adopted.

I have another suggestion to make, as to a means of raising a revenue for carrying on this work. We know that when a text-book is adopted by a state board it is a great asset in the way of revenue to the publishing house that issues the book. There is one book that I have in mind that has been worth more than a hundred thousand dollars to one special house. If we could by some plan

have a proper text-book adopted by the whole nation, or by individual states, and reserve the right to a royalty on that book, I believe we could get a good revenue for carrying on this work. The author of this book should not receive any revenue, but should render his services from an unselfish standpoint.

I believe that when this work is started in that way it will be of great benefit for the future generations, and will be more successful than it has been in the past.

Dr. J. P. Gray, Nashville, Tenn. I wish to add a word on this subject, particularly with reference to the text-book. Tennessee, in my opinion, leads in that respect. Here is a little pamphlet containing some of the ideas that we had incorporated in the last text-book adopted.

I do not believe that it would be advisable to attempt to collect money from the publishers of the text-book. But your board can possibly be induced to adopt a chapter to be placed in a text-book. The book referred to contains a very useful chapter, and we had but little trouble in having it incorporated. It is being used in schools by seventy-five thousand children, and we are beginning to reap some benefit from it.

I disagree to a certain extent with Dr. Towner's and Dr. Corley's conception of this work. I believe that one of the first things to do is to begin with the instruction of the children, or rather of the teachers and then of the children, as I believe we could reach more people in that way. It is difficult to obtain the privilege of getting at the children and doing this work. You will also find that dentists are very enthusiastic soon after the work begins, but when it has gone on for a while they will begin to be very busy in their own offices, and as a consequence will not attend to this work.

Dr. Corley tells me that he can examine two mouths in one minute. He cannot examine one mouth in two minutes, nor in three, successfully. I am not speaking against this work, but about where it should begin. We will have to spend some money in the preparation of the articles which we wish to have put into the text-books, and should be glad to have them incorporated, whether we get any revenue therefrom or not, to begin the work of education. The dentists of the town must go before the teachers, give them lectures and get them interested enough so that we shall be permitted to examine the children's teeth. Did you find that to be the case in Cleveland, Dr. Corley?

Dr. Corley. They hired men to do that work.

Dr. Gray. You are not going to be able to hire men to do that work. In Ohio you may do it, but in Virginia a law has been passed that a dentist must have the M.D. degree before he can be registered, and when we get to that point we may be able to do that. I am ready to do my part, as far as the work is concerned with children. We sent out and invited the people to bring the children to the clinics, and we were willing to do that work, because we can teach a child how to take care of his mouth. While I am to a great extent in accord with Dr. Corley's method, I wish to emphasize that we have to lose sight of the personal benefits to be derived from this work. In reality, ninety-five per cent. of the dentists are doing this work for their own benefit largely.

We must lose sight of the personal benefit to be derived from this movement, and it should be impressed upon

the public that it is for the benefit of the children. There is no question that it will benefit us in time, but why not keep this to ourselves! The newspapers in Cleveland at the time when the Oral Hygiene Congress was being held there, said that the dentists were formulating plans to extract more money from the people. We must educate the people for their own benefit, beginning with the teachers.

Dr. A. G. Friedrichs, New Orleans, La. We have heard a great deal of oral hygiene at this meeting, and I believe the work that has been done is commendable, but in my opinion the only way in which we can do this work is by first educating the physician, who must impress the importance of this subject on the mother. The foundation of all this matter, so far as the teeth are concerned, is laid at a period in which the physician has entire charge, and it is his duty to call the attention of the mother to the teeth, and, from the child's infancy, begin to care for them. We do not see these children until later. This work of oral hygiene is very important, but children cannot get these ideas into their heads. The consequence is that when they have grown beyond a certain age great damage has already been done. Therefore the mothers should be called together for public lectures, as they are the ones to look after the children. Of course, it would be well to give the teachers instruction so that they can teach the children and chart their mouths. They should insist that the children present certificates as to hygienic mouths, and that no child shall come into the public schools unless his mouth is in a healthy condition.

I made the proposition to the school authorities in New Orleans that we chart all the children's teeth in the city. We offered to take care of the teeth of those who could not afford to pay for the work, and also suggested that the board pass a resolution insisting that no child come to school unless his mouth be in a healthy condition. We of course instantly ran up against the ignorance of the masses. Our proposition appeared to them as a matter of graft; they could not understand how any man could be inspired by altruistic motives, and thought that we must be stimulated by some personal advantage to be gained.

In Germany and in France, as in any portion of the United States, the law is enforced that no child shall be accepted in the public schools without presenting a certificate of vaccination. If the authorities can demand that, why not the other? We all know that contagious diseases are more often transmitted through the medium of the mouth than in any other way.

Dr. J. P. Corley, Greensboro, Ala. I wish to say at the outset that some years ago Dr. Gray and myself came to an agreement that we would always take opposite sides of every issue. Dr. Gray made a rather serious accusation this morning as to my method of securing the co-operation of the profession in this work. He said that I have put it on a mercenary basis, and have held up to the profession the reward of remuneration. In this Dr. Gray was mistaken.

I have been visiting schools throughout the country and speaking to dental students, most of whom have entered the profession for the sake of making a livelihood. It would be illogical to assume that such an audience of students could be appealed to by the altruistic, scientific spirit which we hold out to Dr. Gray and the older men. These students have not yet developed the ideal of professionalism, which is a product of develop-

ment, like the training of the fingers, or the eyes, and the rest of the human mind and body. I have usually wound up my appeal to that class of hearers by stating that, if the gospel of hygiene were carried throughout the land, the field of dentistry would increase nine hundred per cent. and the dental offices throughout the land would have nine times as many patients as visit them today, and the dentist would thereby reap a financial reward. Now, I submit it to you whether I have committed treason by laying that proposition before such an audience of students.

Another question of logic is involved here. Dr. Gray has said in the same breath that ninety-five per cent. of the dentists could not be reached by any other method than through their pocketbooks. If that be the case, and if we expect to see the day when this gospel of hygiene will be popular, we shall have to secure the co-operation of some of these ninety-five per cent. by holding out the hope of reward in dollars and cents. I am accused of being an idealist, but I have to be a little practical as I go along. We were told yesterday that it is difficult to raise money for this movement because the majority of dentists do not expect a good return from it. The other five per cent. are still struggling along, trying to convince these ninety-five per cent. Dr. Gray advised to begin this campaign with the teachers. We will go back a little farther than that, and begin with the dentist who has to teach the teachers. These ninety-five per cent. of the profession that Dr. Gray referred to are hopeless; you cannot teach an old dog new tricks. So we have to begin with the dental students.

At the request of the National Association I took up the work with the colleges, and this year, so far, I have visited eighteen of the colleges in the United States and have spoken to the students, and to the faculties when they were not too busy. We have made requests of the faculties for innovations. I realize that, as a profession, we are indebted to these men chiefly, but as with all men of accomplishments, it is difficult to convince them that they are lacking in some respects. We have asked them, "Do you believe in having inspection in public schools?" They said, "Yes, the public ought to have that." Then we have asked, "Do you have your students' mouths inspected?" "No." "Are you willing to request the students to have their mouths examined?" "We will, if they want to." Then we asked, "Won't you go a little farther, and require them to do it? Will you keep a record of this and send it to the National committee, who want to know the condition of the mouths of these students? And then will you have their mouths examined once a month from that time on, and will you require that before they are graduated their mouths shall be free from cavities, perfectly hygienic, without diseases of the gums?" We did this to put the work on a practical working basis—and I want you to guess how many faculties said they would pass that regulation. There was one college that did not have to enforce this regulation, the students volunteered to do it, and the faculty agreed to it. This regulation is surely going to be adopted in all our schools.

We have also appealed to the National Association of Faculties. We went before the examining boards in every state, and said, "When men apply to you for license, will you inspect their mouths, and, if their mouths are filthy, if they have unfilled cavities, if they need den-

tal attention, will you turn them down? Will you not say to them, 'We cannot commission you to go out and represent a scientific profession and preach a gospel that you do not practice in your own person'?" That request is not an idealistic dream; it is a practical measure, and is going to be universally adopted.

There is a great deal of truth in Dr. Friedrichs' remarks in regard to the medical profession, but how are we going to teach the medical men? We have to teach the dentist before he will teach the medical man.

Referring to Dr. Walker's paper of last night, I want to commend the work that is being done in New Orleans, involving an enormous expense to the men engaged in it. I know men in this audience who have spent more out of their own pockets this year than we asked you for yesterday as an appropriation from the Southern Branch. There has been a lot of discussion with reference to the wisdom of lecturing to children. We have been old so long that we have forgotten the receptivity of the child's mind, of which we have had practical illustrations. We have cases on record to show that they profit by such lectures. They go home by-and-by and induce their mothers to buy tooth-brushes for the whole family.

About a month ago I lectured at the high school in Birmingham before an audience of 865 pupils and 32 teachers. I brushed my teeth on the platform, and showed the children how it should be done. That afternoon a half-dozen boys saw me on the street, and said, "Hello, doctor, are you still brushing?" Soon after that, in that same school, when one of the teachers asked the class to give an example of teaching by illustration, ten of the class gave my example of brushing the teeth. Dr. Friedrichs has either overlooked it, or has not been informed as to how we are proceeding with lectures. We have three sets of lectures—one for the pupils, one for the mothers, and one for the general public. I know that in Cincinnati they have lectured to forty-four mothers' clubs. We are inviting the mothers to come, and induce them to teach their children to come. So we are educating the mothers as well as the children, the physicians, and the dentists. One of the most hopeful features of this work that I have seen so far is the fact that the dentist is learning to brush his teeth. The time has been that when an old friend rushed up to you at the annual convention and said how glad he was to see you, you would have to smile and back off to keep from feeling nauseated. The most hopeful feature of the situation, in my opinion, is that the dentist is brushing his own teeth, and is also learning to brush the teeth of his children.

In reference to Dr. Griffis' paper as to the duty of the state associations, I may say that we are getting the state associations in line. Ten years ago I put the proposition of giving lectures before the Alabama society, and a committee was appointed to carry the idea through, but it died right there. We want to have subsidiary or auxiliary committees in every state association. We have such auxiliary committees to the National in Alabama, in Tennessee, and in several other states, to assist in securing the co-operation of these states. Every state society should maintain a committee, and have one public session of the annual program devoted to this work.

As to Dr. Towner's paper on the teaching of oral hygiene to dental students, we first requested the faculties to require

every senior to write an essay on this subject, and deliver it before the senior class, and then we requested of the students that they explain the dental toilet to their patients.

This movement is growing. It must be remembered that this is the first year that it has been thoroughly organized for consecutive work, and we could not have succeeded this year if the movement had not been financed in a small way by the Dental Manufacturers' Association.

Dr. W. H. Henthorn, Loraine, Texas. This campaign must be conducted in such a way as to make the parents realize the necessity of dental hygiene. The physician does not pay a great deal of attention to his own teeth, much less does he go to the trouble of teaching parents the necessity of taking care of their children's teeth. In the cities more attention is paid to hygiene than in the rural districts. The children are never allowed to come to the table with dirty hands, but it is not so in regard to the teeth, although it is much more important that the teeth should be kept clean, since it is in the mouth where the function of digestion begins. If we can get the public to realize that it is necessary for them to keep the mouth and teeth as clean as the face and hands, we shall have made a long stride in the progress of hygiene.

These principles must be taught to the mothers, the teachers, and also the physicians. Of the five physicians in my town, only one has a set of teeth fit to look at. The physicians as well as the parents must be taught in regard to oral hygiene.

There are various ways in which to increase the practice of dentistry, but this is one of the best that I know of—that is, teaching the parents and the children the necessity of taking care of their teeth. I clean teeth every day in my office, and teach my patients to clean their own teeth. The other day a very well dressed and handsome young lady came into my office presenting teeth that were in a horrible condition. I extracted one molar that had been broken off and found that the gums and roots had entirely separated. The gums were so swollen that they covered the teeth. I began treating the gums, and now the patient's mouth is in a fair condition. After extracting the tooth, I told the patient's mother what was necessary in regard to the teeth, and impressed upon her the necessity of the daily cleaning of the teeth in order to preserve these organs and prevent disease from spreading.

We must devise some plan by which we can have the teachers of the schools teach their pupils the necessity of taking care of their teeth, and also teach their fathers and mothers. In the country they have public exercises every Friday, which a great many parents attend. If the dentist could on these occasions instruct the mothers, the fathers, the teachers, and the pupils, we should accomplish a great deal of good.

Dr. J. E. Storey, Beaumont, Texas. We must start at the root of this matter. If we elect men to our legislature who will enact the laws necessary for our needs we shall then begin in the right direction. You notice that the legislature of Texas has already recognized the fact that a sanitary condition is needed on the trains, and today we are able to clean our teeth in a different vessel from the one in which we wash our face and hands. Yet they do not recognize the fact that such measures are as necessary

in the schools as they are on the trains. They know that disease is spread by the mouth, that more disease enters through the mouth than in any other way. I am satisfied that half the amount of bacteria that we find in the human system enter through the mouth, and, if the mouth were kept clean, half of the tuberculosis we have today would not exist. It should be a matter of pride for us to elect the proper men to our legislatures, and so have the desired laws enacted.

Dr. Corley. Ten years ago we undertook to have a text-book adopted by the Alabama Senate, but the chairman of the Senate, when approached on this subject, said, "Son, how much money have you got?" Of course we had none, and the chairman of the Senate informed us that the school-book concerns had a lobby in the capitol which had back of it all the money they wanted, and suggested that if we had no money we had better not waste our time on that proposition.

Dr. W. E. Walker, New Orleans, La. I wish to compliment Dr. Towner on his paper. It was very complete; only one aspect of the subject was omitted, that of diet. I failed to hear him state that the students should be taught the feeding of children, and the hygienic care of babies, that they might teach the mothers.

Dr. Friedrichs remarked that children were unable to comprehend this subject. This has not been my experience in New Orleans. I am afraid that he is not sufficiently serious in addressing children. It is true that some dentists have not the ability to impress children, yet it does not take oratory or gymnastics to interest children, and, owing to their receptive minds, we can do more with them than we can with their mothers.

As to a revenue from text-books, that cannot be relied upon. The effort to inspect the mouths of children in the public schools made by Dr. Friedrichs was not the first of its kind. Nine years ago I made a similar proposition, which was turned down. There seemed to be no disposition on the part of the authorities to have the children's mouths examined, because of a lack of education in hygiene; but they are coming to it. They see that we are working for the public, and our superintendent of public instruction and his associates are in favor of a clinic if we can secure for it the best practitioners of the city—but not students. They are now hearing our lectures, and they have pronounced these lectures—and I claim no credit for this myself as four others are engaged in this work—the most instructive ones in the course of fifteen or twenty public lectures given by physicians and educators.

As to any profit that might accrue from this work, I am really surprised and disgusted that the material side should be thought of. My own bank account is about fifteen hundred dollars less than it would have been if I had not taken an active interest in this work this year. As to Dr. Corley's suggestion that education of the public along this line would increase the profession's revenue, I think that is an effect that would be very temporary, to say the least. That it might stimulate the public not only to clean the teeth and mouth, which is our aim, but to visit the dentist, may be true incidentally, but the *ultimate* result, in my opinion, would be the curtailment of the amount of money spent by the public with the profession—greater health and economy for the public, and less money for the dental profession. Many practitioners are rather afraid to enter a movement which has for its ob-

ject the education of the public to the point where they will not need our services. Nine-tenths of the professional service we render today would be entirely uncalled-for if the public would prevent the necessity for it, and that is what we are after—the prevention of both disease and deformity.

Twenty-seven years ago the Southern Dental Association took an active part in this work by indorsing a little book entitled "Letters of a Mother to a Mother on the Formation, Growth, and Care of Children's Teeth," and since that time more or less work has been done in this field, but in those twenty-seven years no president has seen fit to give to the Oral Hygiene Committee the fair deal that the present president has given us.

Dr. Corley (closing the discussion on his paper). I wish to make the final plea that you all take a personal interest in this matter. The question is such a large one that we have not grasped it all. The more we study it the more we see its possibilities. Every once in a while some new star rises above the horizon, throwing out its transcendent glow on the earth, and showing some new field that this work leads into.

With regard to the question of remuneration, I realize that there will be fewer fillings to make, fewer irregularities to correct, and by-and-by there will be such a state of immunity from dental disease that our offices would be little more than advisory bureaus. We would realize less reward from mere patchwork, but by-and-by we would come to realize the highest privilege of professional life, and that would pay more than ordinary repair work.

We are trying to secure literature to send to the schools throughout the country; we are trying to introduce our lectures on the chautauqua platform, and in the parochial schools, and to secure the co-operation of the legislatures and the newspapers. Dr. Gray forgot to tell you the status of the newspapers in Cleveland that spoke unfavorably of us. All the intelligent people of the city as well as the better class of newspapers indorsed the work, and, as you have heard, we had an audience of five thousand people on the 18th of March at the inauguration of this movement. I want to tell you further that there is a newspaper in Atlanta which requires that every carrier have a tooth-brush and use it. I want to defend the newspapers, as the intelligent ones are among our strongest supporters. Of course there is a "snide" element in newspapers that we will have to overcome, just as in dentistry, but the better class of papers are glad to take up the work. I have been treated with great courtesy by them generally. The time will come when the associated press dispatches will carry throughout the land news of every important meeting of men who are working for the benefit of the community. Of course there are a lot of newspapers which will have to be educated up to the importance of this work; all of this is a matter of education, and I realize that it cannot be perfected in a day. But don't let us be discouraged; let us wait until next year and see what progress will have been made. If every dentist in the land were as enthusiastic as Dr. Gray this movement would have already been carried to perfection. Let us keep on in this work! I hope you will pardon me for being so emotional in this matter. I have spent my whole life in it. Dr. Gray said before an intelligent audience recently, "This work is pulling Dr. Corley down;

he has aged ten years in the last four, and is a poorer man today than he was then."

Before the session adjourns, I hope this association will take some official action on the work of the Hygiene Committee of the Southern Branch. We have only given you a foretaste of what we have in store for you. We are not going to abandon the work, but we wish you to take some official action in one way or another, in order to uphold the hands of the Oral Hygiene Committee. Some teachers and some of the biggest journals of the land have thrown obstacles in our way instead of helping us, and these and other things are making it difficult to carry on the propaganda, but there is to be a crisis at Denver this summer, when the National Association will take action in some way.

Dr. J. D. Towner, Memphis, Tenn. I want to call your attention to the necessity of dental inspection beginning in the dental schools. Dr. Corley has aptly said that the whole movement is a matter of education. It is education wherever you begin, whether with the student or with the infant. In my paper I said that, and laid special stress upon the education of the student to the requirements of oral hygiene, and through that source to the public. I referred to the fact that the work of oral hygiene, as it concerns the public, should begin with the infant instead of with the adult. In his preparation for work in this field the undergraduate has to have practical experience, and in order to further that end the inspection has necessarily to be made by him, not only that he may familiarize himself with the necessity of the order of the inspection, but that good may come of it for the person inspected. This problem is being met in as practical a way as possible. We have inaugurated inspection in our schools, and generally find that the condition of the mouth depends to some degree on the understanding a student has of the subject. Students are given to know that, and a record of each mouth is made, not only of the defects but of the good conditions, and a record is also kept of all mouths. The student and the dentist must have clean mouths before they can tell others how to keep theirs clean. In my final examination I gave the class ten very practical questions, and in the eleventh question I embodied the whole field, viz: State in your own way your idea of the importance and opportunities of teaching oral hygiene. I wish I had some of the papers with me to read some of the answers given to that question. Half a dozen of these answers would make an intelligent paper to be delivered before this association. I felt very proud of the replies. Some of them were sermons, and it makes my blood wax warm to know in that way that my efforts are appreciated, and that the necessity of this work is so fully recognized by the student. In this year's work not one reference has been made to the financial side of it, and never will be, for it is placed upon a humanitarian, altruistic basis, where it must stand if the student and the practitioner would do their full duty.

The preparation of the student is all-important, and by student I do not mean the undergraduate only. We are all students, else we stagnate. Unless we progress, we retrograde. We must educate the student, who in turn must educate the public to a proper realization of the importance of this movement. I am very sorry in one respect, and proud in another, of the man who has exemplified by his life and teaching the gospel that

has been spread broadcast. I honor this man Fletcher, because the example of his life tends to the uplifting of the human race, and to concentrate the attention of the people upon this subject. I am sorry that the dental profession has stood aside, waiting for these good men to give their money to preach a gospel which we have all been supposed to practice. We must hold up their hands, if we can do nothing else. It has been a gratification to me to observe the interest that has been manifested in our work by this association. While we are co-laborers with the National Committee on Oral Hygiene, we have done our work in the South. We have made sacrifices because we felt we had the support of the Southern Branch of the National Dental Association. We are working for you and with you, and we want your support and commendation. Nothing more spurs the energy of a man than the recognition of what he has done. We have not done this work with an idea of remuneration or compensation, but are simply asking that you not only commend the efforts of the present committee, but lend your support to the incoming Committee on Oral Hygiene. Stand by them, and they will do work of which you will be proud.

It seems a shame that at this late date we should begin the teaching of dentistry where it should have begun in its inception. We are just now emphasizing the fundamental principles of dentistry. Hygiene is not a specialty of dentistry; it is its fundamental principle; it has relation to every branch of dentistry. I want to go on record as stating that any man who makes public announcement of the fact that he is making a specialty of oral hygiene and prophylaxis to the exclusion of other branches, is in my opinion very grossly deceiving himself or wilfully deceiving the public. The man who proposes to practice hygiene of the mouth and who sends his filling operations to the other dentist does an injustice to the patient, to the dentist to whom he may refer him, and to himself. Every dentist must himself make every operation in the oral cavity to create and preserve a hygienic condition.

The next paper announced by the President was one by H. A. ENGELHARDT, M.D., Houston, Texas, entitled "The Relation of the Diseases of the Nose and Pharynx to Dentistry," as follows:

The Relation of the Diseases of the Nose and Pharynx to Dentistry.

By H. A. ENGELHARDT.

THE perfect health and comfort of every individual being depends largely upon sufficient breathing-space. My observation leads me to believe that a great many of the ills in life might be materially lessened by a more thorough knowledge of the physiological functions of the organs of the body.

In this article I shall endeavor to demonstrate the frequent and dangerous sequelæ which follow the diseases of the nose and pharynx. A short description

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of the anatomy and the physiological functions of these parts may help to give a clearer idea.

ANATOMY OF THE NOSE AND PHARYNX.

The nose is anatomically divided into two parts—external and internal. The external part consists of the nasal bone and the nasal process of the maxilla, and of cartilaginous framework. The integument adheres loosely to the bony but very firmly to the cartilaginous parts. Internally, the nose is divided by the septum into two irregular cavities, the nasal fossæ. They open in front by the two anterior nares, and terminate behind the pharynx by the posterior nares. The roof of each fossa is formed by the cribriform plate of the ethmoid, the floor being formed by the horizontal or palate process of the maxilla and the palate bones. The three turbinates divide these fossæ into the superior and the middle and inferior meatus. The superior and middle turbinates arise from and form part of the ethmoid, the inferior turbinate springing from the maxilla.

The pharynx is situated behind the nose, mouth, and larynx. It is about four and one-half inches in length, and is subdivided into the naso-pharynx, or upper part, which terminates at the level of the palate; the oro-pharynx, or middle portion, which extends to the vestibule of the larynx; and the laryngo-pharynx or lowest portion, which opens into the esophagus at the lower border of the cricoid cartilage. The posterior nares open into the naso-pharynx. Here are found the "Luschka tonsils," more generally known as adenoids. The Eustachian tubes also enter into this part of the pharynx. Within the limits of the oro-pharynx we find the uvula, the soft palate, and the faucial and lingual tonsils.

PHYSIOLOGICAL FUNCTIONS OF THE NOSE AND PHARYNX.

The nose is an organ of smell. Nature intended that all the air we breathe should pass through the nose. Its functions are: (1) To raise the temperature of the outside air to that of the body. (2) To moisten the air. (3) To collect all foreign bodies. (4) To guard the vital parts of respiration from injury by irritants, as vapors, gases, and fumes. The nasal fossæ and pharynx give resonance to the human voice; the pharynx also has an important function in deglutition. If in any way these functions are partially or totally impaired, then the lungs and the digestive apparatus are imposed upon, the development and vitality being also considerably reduced.

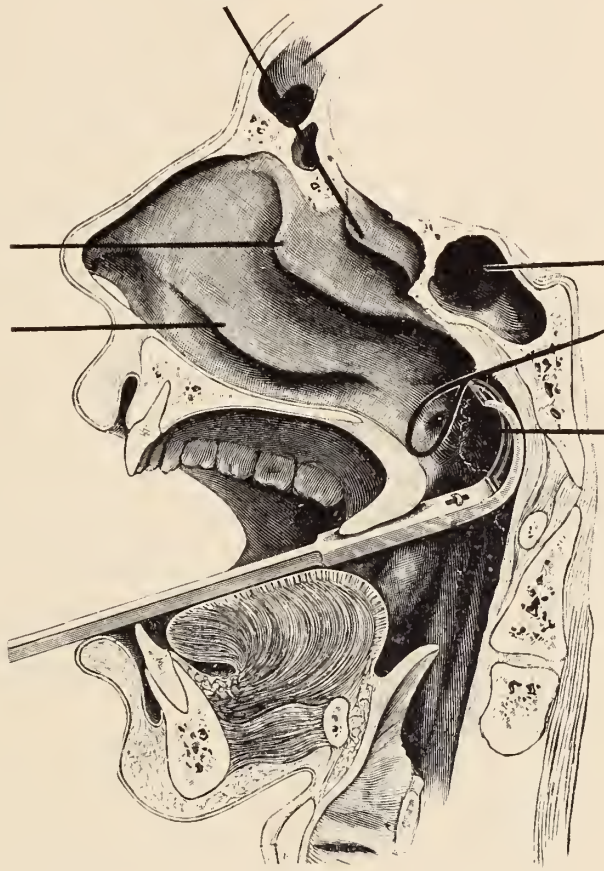
CAUSES OF FUNCTIONAL DISTURBANCES.

The causes which may impair the functions of these organs can be either congenital or acquired. Of the acquired causes I may mention tumors, polypi, deviation of the septum, hypertrophied turbinates and tonsils. Certainly the most frequent are those of adenoid vegetation.

SYMPTOMS OF NASO-PHARYNGEAL OBSTRUCTION IN CHILDREN.

The earliest symptoms of obstruction in the nose or pharynx in infants is a watery discharge from the nose, the child being able to nurse for only a few minutes at a time because it cannot breathe. In older children the symptoms are severer and more constant, the discharge

from the nose being muco-purulent—they have more or less cold in the head, sleep with the mouth open, are very restless, and have a hacking cough. The facial expression becomes stupid and dull. per cent. of cases the tonsils are enlarged. Every one of us who has had a cold knows the inconvenience connected therewith, and how the system is run down in a few days. Think of these poor chil-



The dulness is in part explained by the impairment of hearing and by the obstruction of the cerebral lymphatic circulation. On examination, the child shows a pinched face, with a broad nose, and goes about with open mouth, dry, parched lips, and coated tongue. At the posterior pharyngeal wall we see a slimy, muco-purulent discharge, and in twenty dren, constantly having a cold or obstruction of the naso-pharyngeal passages! What detrimental effect must it not have on the system, on the development of the child! Can we wonder that these children are backward at school and backward in growth, in the development of brain and body?

The effect on the dental arches is

marked: The upper arch is narrow, high, and elongated, instead of broad and short. Malocclusion in its various forms will be found in these children, with obstruction in the air-passages. Alkan of Leipzig, after an extensive and careful investigation, came to the following conclusions: (1) The alveolar arch of the newborn child is characterized by its shortness; it furthermore gradually assumes a higher and broader aspect, in proportion to the growth of the adjacent structures. (2) In subjects with adenoids was found an arch distinctly higher, longer, and narrower than normally. (3) The configuration of the palate is not dependent upon the skull formation. (4) The anomalies of malposition of the teeth are very frequent in the abnormal positions of the maxillary bone and alveolar processes. He also found that in atrophic conditions of the nasal fossæ the palatal arch was not so high, but broader and shorter than in the normal state. From these measurements one can easily see that atmospheric influences in the nasal fossæ have a decided bearing upon the shape and height of the dental arch.

I think the sequelæ following the obstruction of the air-passages are so dangerous to the health of the children that the knowledge of these symptoms should be known to every physician, dentist, and parent; since only the early recognition and proper treatment of this condition in its incipience will prevent those dangerous sequelæ and restore the health of the child.

NECESSITY OF EARLY EXAMINATION AND CORRECT TREATMENT.

The rhinologist should remove the cause of the obstruction first, and the orthodontist should correct the malocclusion. Here I would insist that the orthodontist should have a thorough knowledge of medicine, particularly of physiology. How often do we see children who are mouth-breathers, anemic, thin, nervous, and suffering with indigestion, being treated by dentists who place mechanical appliances into the mouth, thus adding to the discomfort of the patient without removing the original cause of the trouble! These treatments often extend over two to five years' time. During this period the child attends school, and is taxed both mentally and physically. Is it a wonder that we are developing a nervous nation? The specialist in any branch must never forget to keep in mind the whole body!

The school board demands the examination of school children by an oculist, at various times, for infectious local eye diseases; is it not also necessary that a rhinologist and a dentist examine these school children, in order to avoid the evil effects which may result to the growing osseous structure of the oral cavity, to the neighboring tissues, and to respiration, from the obstruction in the air-passages?

STATISTICS.

Statistics prove that from fifteen to twenty-five per cent. of children between the ages of one to fifteen have adenoids. About seventy per cent. of all cases occur between the first and fifteenth years; twenty-six per cent. between the fifteenth and thirtieth years, and four per cent. after thirty. In sixty-four cases of adenoids Uffenorde found three cases to be of tuberculous nature. Dench reports that over fifty per cent. of middle-ear trouble is due to adenoids. The percen-

tage of adenoids in high arch and malocclusion is believed to be large, but I have been unable to find any statistics in regard to this.

DIAGNOSIS BY MEANS OF RHINOSCOPY AND PALPATION.

The diagnosis of the obstructions in the nose and pharynx is made by anterior and posterior rhinoscopy and by palpation with the fingers. By means of anterior and middle rhinoscopy we can recognize any obstructions in the nose, and sometimes adenoids in the pharynx when the nasal fossæ are wide and unobstructed. Posterior rhinoscopy is seldom practical in children. In posterior rhinoscopy we place the mirror behind the soft palate, at the same time having the patient breathe through the nose, a light being reflected from the head mirror to the rhinoscopic mirror. Here we notice the condition of the naso-pharynx. In young children the diagnosis of adenoids can readily be made from the symptoms and the general appearance of the children, also by digital examination of the walls of the pharynx. After thoroughly cleansing the hands, I ask the child to open the mouth, then, pressing the cheek inward with the left hand between the cusps of the upper and lower teeth for protection, with the index finger of the right hand I slip over the tongue, behind the soft palate, and up into the naso-pharynx. The finger must be passed swiftly over the vault of the pharynx, into the fossa of Rosenmüller, the posterior nares, and then withdrawn. This examination takes only a few seconds, and, although disagreeable to the child, is positive. Despite the danger and the consequences attaching to obstruction of the air-passages, the prognosis is favorable if the operation be performed early and if removal is complete.

THE ANTRUM: ITS ANATOMY AND ANOMALIES.

Of the accessory sinuses of the nose, the antrum of Highmore is the most frequently affected, on account of its proximity to the nose. The inner wall with its openings enters into the nose, and the floor of the antrum is formed by the alveolar process which supports the teeth. The antrum is an irregular pyramidal cavity occupying the body of the maxilla. The roof forms also the floor of the orbit. The anterior wall extends from the side of the nose to the malar ridge. The canine fossa occupies a large part of this wall. It is a shallow groove, running upward from the canine to the infraorbital foramen. The inner wall of the antrum forms the outer wall of the nasal cavity. This wall is very thin and has the normal openings of the sinus over the inferior turbinate. The floor of the sinus is formed by the alveolar process. The floor of the antrum is, next to the nasal wall, of most practical importance, because of the proximity of the roots of the teeth, as disease of the roots of the teeth and their surrounding structure may spread to the antrum. A knowledge of the relation of each alveolar socket to the antrum is of practical importance owing to the frequent opening of the antrum through one of these sockets. No other part of the antrum shows such difference in its make-up as the floor, and no other portion is of so much practical importance. In some cases the floor is as thin as paper; in others, again, it is as much as half an inch thick. Sometimes the teeth reach directly into the sinus, covered

only with the mucous membrane. The size and shape of the cavity varies in each subject, and even in each side of the same individual. We speak, for instance, of a normal-sized cavity, when the floor of the cavity lies on the same level as that of the nose. When it lies above we speak of a smaller, and when below, of a larger cavity. In the last instance we speak of a sinus alveolaris. If we bear in mind the great difference in the thickness of the alveolar process it is not difficult to comprehend why so many people have never been afflicted with disease of the antrum in spite of having had in each upper jaw nothing but carious roots, with great pain from numerous attacks of periostitis, while others having teeth almost normal, with a slight periostitis of the dental root acquire an empyema. This goes to prove that a thick alveolar process guards against infection. The antrum often shows bony prominences, or membranous ridges, causing a stagnation of secretion. More important is the division of the antrum into anterior and posterior halves by a vertical plate. The anterior section in this case opens through the ostium maxillare into the middle meatus. The posterior section opens into the superior meatus. (Zuckerkandl has proved this beyond all doubt.) Seldom do we find that both open in the middle meatus. This, again, shows the important practical bearing of these anomalies in diagnosis and operative treatment.

ETIOLOGY OF DISEASES OF THE ANTRUM.

As to the etiology, the opinions of various authors differ. Some claim that the dental origin is the most frequent, being from 18 to 64 per cent., but the majority are of the opinion that the nasal origin is the predominating one.

In going into the details of the dental origin, I have chosen Hajek's classification—

(1) Acute inflammation; subdivided into—

a. Acute pericemental abscess.

b. Acute periostitis.

c. Circumscribed or diffuse osteitis of the alveolar process.

(2) Chronic inflammation; divided again into—

a. Chronic pericementitis.

b. Penetration of the alveolar process from a diseased tooth.

c. From therapeutic efforts in treating root-canals and in the filling and crowning of teeth—by way of the lymphatics.

d. From cysts which break into the antrum.

(3) Traumatic origin; for instance, extraction of teeth.

(4) Malignant tumors.

M. H. Cryer believes that more teeth are lost from antral disease than primarily cause it; this opinion is also confirmed by E. S. Talbot.

SYMPTOMS OF DISEASES OF THE ANTRUM.

The symptomatology is, owing to the proximity of other cavities, a changeable one. Pain and headache are usually referred to the temporal region, and those of dental origin to the affected tooth. There may be tenderness upon pressure and swelling in these regions and in the canine fossæ, disturbance in the sense of smell, dryness in the throat, and more or less obstruction of the nose. There may

or may not be a discharge of the contents of the antrum; when present it is, as a rule, one-sided. Eczema of the anterior nares may be present.

DIAGNOSIS OF DISEASE OF THE ANTRUM.

From the variety and inconsistency of the subjective and objective symptoms we readily see that only in certain cases of antrum trouble is positive diagnosis possible without a thorough rhinoscopical examination. These cases are those of severe and acute types of infectious nature, and sometimes those of dental origin. The following are some of the methods employed to diagnose antrum trouble:

(1) Transillumination of the sinus by means of an electric lamp placed in the mouth. Since there is such difference in thickness of the anterior antral wall, this test is not of sufficient accuracy, as we depend upon the shadow. The thinner the wall the lighter the shadow, and *vice versa*. In this manner an empyema may be diagnosed, while in reality it is a thick anterior wall.

(2) The X-ray method, which is more valuable than transillumination, because it will show us the changes in structure of the cancellated tissue.

(3) The probing or syringing of the antrum through the natural opening. This is very difficult, and in some cases impossible.

(4) The best and positive method consists in puncturing the nasal wall underneath the anterior third of the inferior turbinate with a straight or half-curved cannula.

METHODS OF TREATMENT OF DISEASE OF THE ANTRUM.

In the treatment of antral trouble we should first remove the cause of the disease; and secondly, establish the unobstructed discharge of the pathological secretion collected in the antrum. In every case of antral empyema it is of importance to keep in view the fact that other sinuses may be affected. Tedious healing and unsuccessful operation arise from this cause.

Cooper's method. Cooper's method is more generally employed by the dental surgeon. The most suitable places for the opening of the antrum are through the sockets of the second bicuspid and the first molar, since these sockets are nearest to the antrum. The antrum may also be reached through the first bicuspid, second molar, or third molar; this, however, renders difficult not only the operation, but the after-treatment as well.

In Cooper's method the following possibilities should be kept in mind: (1) An abnormally high arch. (2) A deep canine fossa above the socket through which we would enter the antrum. (3) A distinct bulging of the external wall of the nasal fossa—this causes a contraction of the antrum at its floor.

When the trouble is of purely dental origin, and when the mucous membrane of the sinus is not extensively affected, Cooper's method will prove satisfactory. When the trouble is not of this type, or when it is associated with other sinus troubles, this method is a hopeless one.

Puncturing the nasal wall and drainage. Another method is the puncturing of the nasal wall of the antrum, underneath the anterior third of the inferior turbinate, by a straight or half-curved

cannula. By a daily washing of the antrum through this cannula, and afterward blowing it dry, a cure is effected in about 70 per cent. of cases.

Luc-Caldwell operation. Should a case not yield in four weeks' time to the just-mentioned method of treatment, the total operation after Luc-Caldwell should be recommended. One may accelerate a cure in these cases by sweating the patient and by internal medication with potassium iodid.

The Luc-Caldwell operation can be performed under local as well as general anesthesia. When general anesthesia is used, the nasal fossa on the side to be operated upon should be tightly packed with cotton tampons, to prevent the inhalation of blood. A gauze tampon should be placed between the cheek and the teeth posteriorly to the incision. The lips being retracted by an assistant, an incision is made to the bone, just above the roots of the teeth, from the canine to the second molar. The periosteum with the mucous membrane is then separated from the bone by a periosteal elevator. With the chisel and bone-forceps the anterior wall of the antrum is carefully removed so that a finger may be introduced and all crevices can be inspected. All of the diseased mucous membrane is then thoroughly curetted, and the cavity cleansed. These are the most important points in the operation. Care should be taken of the infraorbital nerve in curetting the roof of the antrum. With the chisel, the bony part of the external wall of the nose under the inferior turbinate is then removed, to the floor of the nasal cavity, leaving the mucous membrane untouched. With the knife a flap of this mucous membrane is made in such a manner that its attachment at the floor of the nasal fossa is left intact. This flap is turned over to the floor of the antrum. The antrum is now slightly tamponed with iodoform gauze strips, and drained through the nasal fossa. The incision over the incisor fossa is then closed. The after-treatment is simple, the iodoform drain being removed after from six to eight days. In place of the frequent washing of the cavity, iodoform powder is blown into it, thus preventing an increase of secretion.

The success of this operation depends upon thorough removal of the diseased mucous membrane.

Discussion.

Dr. J. A. Gorman, New Orleans, La. The essayist's paper certainly gives a great deal of food for thought to the dentist.

One of the most important features the essayist emphasized, from the orthodontist's standpoint, was the importance of proper breathing, especially in infants. So many mothers, when asked if their child sleeps all right, will say, "Yes." Then if you ask them a few more questions, say, whether the child keeps the mouth open while asleep, they will say, "Yes, but what difference does that make?" They do not realize the importance of normal breathing for the child. One of the questions I ask in this connection is, "Would you drink water through your nose?" Of course they will say, "No." Then I tell them that it is no more ridiculous to drink water through the nose than it is to drink air through the mouth. The air with all its filth and germs goes to the posterior mouth and lodges on the tonsils, causing them to become infected; moreover the air is not properly warmed as it would

be in going through the nose, to say nothing of the proper filtration. Too much stress cannot be laid upon the importance of proper breathing, especially in infants.

The essayist spoke of children having snuffles, or similar troubles. When attention is called to this, the mother says, "Why, that is no more than Mary had" —Mary on investigation exhibiting a narrow arch and a small nose.

The essayist in my opinion did not lay enough stress upon the development of the mandible in mouth-breathing. In mouth-breathers we observe a lack of development of the mandible. The mouth is being kept open continually, and during the development of the rest of the bones of the face and head the muscles that hold the mouth open bring pressure to bear on the mandible, bringing about this arrest of development.

In regard to antral disease, I wish to ask the essayist how often he finds that associated with mouth-breathing.

A Member. I would like to ask the essayist if a man should not, especially in the country in the open air, wear a mustache on account of the sifting of the air? I have often thought of this since it has become so fashionable for men to shave their mustaches.

Dr. W. E. Walker, New Orleans, La. We are under great obligations to the essayist for his paper, which is very instructive.

I wish to ask the essayist to bring out a point in closing in connection with the etiology of adenoids. The etiology of antral troubles was touched upon, but the etiology of adenoids was not considered. I have consulted some of the rhinological text-books, and as far as I am able to ascertain we seem to be working somewhat in a circle. While adenoids produce mouth-breathing, is it not true that neglect of colds in the head, necessitating mouth-breathing in children, have something to do with irritation of the tonsils and the production of adenoids? I wish to learn something on the etiology of adenoids from the essayist. Certainly this is an age of prevention. We wish to prevent irregularities and mouth-breathing, and as we can prevent these by the removal of adenoids, why not go a step farther and prevent the adenoids?

In this connection mention might be made profitably of the fact that we are not content in moving teeth buccally by simply tipping the crowns, as was formerly practiced by orthodontists, but for some time we have been able to move the roots and in that way get a better purchase on the bone so as to open the symphysis and widen the nasal fossa, the inferior meatus of the nose, to a much greater extent than results when simply the crowns are tipped buccally. I am glad in that connection that at last even Dr. Angle has recently admitted the advisability of moving the roots, even of the incisors, by illustrating an apparatus for bringing the roots out, after the crowns have been moved.

Dr. M. S. Merchant, Houston, Texas. I am glad that Dr. Engelhardt has called the attention of the dentist to the fact that it may be sometimes best to open into the antrum through the nasal cavity.

We dentists feel like boring in all cases through the alveolar process, but from consultations with rhinologists and examination of some of the cases treated by them, I find that they have succeeded sometimes where we have failed by going in through the nasal cavity. I am glad the essayist has chosen this subject, and

I am in hopes that dentists will be more careful hereafter to consult with the rhinologist in cases of antral trouble.

Dr. S. M. Myers, Cleburne, Texas. I wish to ask if it is a fact that adenoids are caused in a great many cases by the silencers or hushers that mothers give to their little ones in order to keep them quiet? I noticed an article in a dental journal not long ago, written by a Frenchman whose name I have forgotten, in which this fact was mentioned. The author claims to have seen many children with deformed arches and adenoids due to the use of these hushers.

Dr. H. W. Lubben, Galveston, Texas. The essayist has fittingly called our attention to adenoids, mouth-breathing, and obstructions of the air-passages. It is almost impossible for the orthodontist to work properly on a patient who is afflicted with any obstruction of the air-passages. Whenever a child presents at my office for treatment of any kind, and I notice any obstruction in breathing, I immediately advise the parent to have the child treated by a rhinologist. If the child is young enough, malformation of the arch and irregularity of the teeth will probably be prevented thereby and the child will get sufficient oxygenation to grow up in health and strength. I have treated children for troubles largely due to adenoids, or polypi, or misplaced septa, who, because they were treated in time, have grown up without any irregularities of the arches and teeth. The modern practitioner is realizing the very great importance of such treatment. At the present time the rhinologist has to be consulted every day. We have two in Galveston whom I know to be always willing to consult with the dentist on these subjects, as well as in cases of antral trouble.

With regard to antral trouble, as Dr. Engelhardt says, we must not forget the fact that there are other sinuses equally as important as the antral sinus, and when we treat a case of this kind unsuccessfully we should call in the rhinologist at once. I had a case of what I supposed to be simple empyema of the antrum. I treated it through the second bicuspid pocket to the best of my knowledge and skill for six weeks, and finally I called in a specialist. Two operations showed that not only throughout the antrum but also in the zygomatic fossa and the frontal sinus there were polypi, which had to be removed before a perfect cure could be obtained. The members of the profession, therefore, should never forget the great importance of the air-passages for the health of the mouths of children.

Dr. J. P. Gray, Nashville, Tenn. After examining several hundreds of skulls and making some dissections, I have found that we dentists do not know all the conditions to be observed in the antrum. The essayist speaks of the antrum presenting nodular formations. In a number of these cases I have observed seeming ridges extending throughout, so that if such an antrum were entered through the mouth, pus would be found in one of these divisions but the trouble in the other divisions would pass unnoticed. The average dentist drills a small opening into the process or around the teeth, and therefore in such a case would drain only one division. He should have an opening large enough for him to examine the entire cavity, and if necessary curet it. In the examination of these skulls I also found that an arrest of development had taken place in that region, and I believe that in most cases the trouble is due to arrest of develop-

ment in the embryonic stage or later on at the various ages of stress in life. We know that during the first two years there is a great strain upon the health of the child if he is not being properly fed and treated. Then at six years there is another period of stress, and so on until he passes the age of twenty-one years. Such a period of stress may occur in the last three months of pregnancy, when great difficulty is sometimes experienced, and as a consequence this arrest of development of the maxilla takes place. The mandible is often involved, more particularly in mouth-breathing, the teeth malocluding because of the arrest of development in the maxilla.

Dr. L. P. Robertson, Marlin, Texas. I want to commend the practical method by which the essayist operates in antral troubles. It has been the custom of a great many practitioners engaged in this work to merely make an opening, irrigate the cavity, and treat as in ordinary abscess, using hydrogen dioxid and all kinds of irritants, which, instead of doing good are doing harm. I am quite sure that in chronic cases with extensive necrosis, the method of making a large opening, curetting, and using iodoform powder is more excellent. In my experience I find this much better than irrigation, especially irrigation with strong solutions. If the cavities are irrigated at all, it should be done with mild solutions.

Dr. B. F. Thielen, Paris, Texas. I would like to ask if the essayist does not find that antral troubles often follow grippe. I have referred several cases within the past year to specialists, where I could discover no dental trouble whatever, and in nearly every one these specialists have found the natural opening of the antrum closed by the inflamed condition of the tissue of the nasal cavity, and sometimes the mere opening of this antrum gives relief. The sooner we recognize these conditions, and turn them over to the specialist, the better.

Dr. Engelhardt (closing the discussion). I am very glad that my paper has brought out such an interesting discussion, and I will endeavor to answer the questions asked.

Dr. Gorman asked about the non-development of the lower jaw. I think that abnormalities due to mouth-breathing, caused by the muscles which keep the mouth open, will in smaller children produce a malformation not so much in the lower jaw as in the maxilla, and that is why I laid so much stress on the maxilla.

In regard to the other question, as to how often we find mouth-breathing in comparison with antral trouble, I would say it is rare that we find antral trouble together with adenoids. We find antral trouble frequently in conjunction with obstruction of the nose, with ethmoidal or frontal sinus trouble. As my paper was directed particularly to dentists, and it was not my intention to bring out the nasal portion of the subject, I did not lay so much stress on that. I might say, however, that the dental origin is a very frequent one, because of the acute and chronic inflammations that go with dental troubles. Yet the nasal origin is more frequent, being due to infectious diseases, particularly influenza.

As to the question in regard to the mustache, I think that it has nothing to do with the filtration of air; the nose takes care of that. We find more bacilli in the nose than in any other part of the body, while hardly any other part of the body will heal so quickly as the nose.

The etiology of adenoids is a very much mooted question, which no one has

so far answered satisfactorily. We have tried to find the cause, and various reasons have been put forth, such as temperature, climate, etc.; again others maintain that the climate has no influence. I believe adenoids to be due to the lymphatic condition of the individual himself. As a rule, children with lowered vitality are subject to adenoids. I think the prevention lies in hygienic measures, in improving the condition of adults and children of a low vitality, and securing for these children plenty of fresh air and good nourishment.

Dr. Merchant speaks of the nasal method of treating antral trouble. In some cases it is impossible to go through one sinus and thoroughly clean this cavity, because, as one of the gentlemen has said, the examination of skulls shows that many antral cavities are divided into separate partitions by the bony structures. I emphasized that in my paper, but it seems to have been overlooked.

One gentleman has asked if nipples or suckers cause adenoids. I do not think they do, though in my opinion they will cause a mal-development of the arch. We frequently, however, find a contracted arch forming in children who use them. I wished to bring out the relation of the mouth to the floor of the antrum. This is most important to the dentist, and also to the rhinologist. Very seldom does it occur that both sides of the antrum are alike in the same individual. On one side it may go just over on a line with the nasal fossa, while on the other it may dip into the alveolar process. Again, we may miss it in going through the socket of the incisor, as there is no antrum about the nasal fossa, because it bulges so far out. In other cases we cannot pass through owing to the thick bone between.

A Member. Do I understand that if adenoids are properly removed, they do not return?

Dr. Engelhardt. Only in two per cent. of the cases.

Dr. Walker. I would like to ask if failure to use the nose will not produce malformations in the oral cavity and pathological changes in the nose?

Dr. Engelhardt. You refer to the manner of breathing?

Dr. Walker. Yes.

Dr. Engelhardt. I am sorry that I did not bring with me this morning a case that I am now treating to show you the picture of a child with adenoids. When a child breathes exclusively through the mouth, the muscles of the nose are impassive, thus preventing the development of the nose. It therefore sometimes happens that, even after adenoids are removed, the child cannot breathe through the nose. To overcome that condition it is best to put on what I call a bridle. This holds the jaw in position, and the child is compelled to breathe through the nose, thus inducing its development.

The President. I desire to thank Dr. Engelhardt for his excellent paper. It has been very much appreciated, and I am sure that it will be a valuable addition to our published Transactions.

Report of the Committee on Necrology.

By GUY MORGAN, Chairman.

The next order of business was the report of the Necrology Committee, by Dr. Guy Morgan, chairman, as follows:

We, your Committee on Necrology, beg leave to submit the following:

Whereas, The Divine Ruler has seen fit to call from us in the midst of their activities our beloved members, Dr. W. G. Whitsett, Dr. H. R. Jewett, and Dr. D. H. McNeil; be it

Resolved, (1) That in the death of these noble men our association has suffered an irreparable loss, and that we shall ever retain tender memories of their untiring efforts for the improvement and elevation of their chosen profession.

(2) That we mingle our tears with those of their friends and loved ones, and that we extend to their families our sincere sympathy and condolence.

(3) That these resolutions be spread upon our minutes and that a copy be sent to the family of each of these departed members.

Respectfully submitted,

Guy Morgan,
H. Clay Hassell,
J. W. David,
Committee.

Motion was then made and carried that the meeting adjourn until the evening session.

SECOND DAY—Evening Session.

The meeting was called to order Thursday evening, May 5th, at 8.30 o'clock, by the president, Dr. Chace.

The President announced that the first item of the evening would be an address by Dr. J. P. Corley, Greensboro, Ala., on the inauguration of the present oral hygiene movement—which follows:

Oral Hygiene: Inauguration of the Present Movement.

By J. P. CORLEY.

Mr. President, ladies and gentlemen, —Unfortunately the first speaker of the evening has not materialized, therefore what I have to say will not be intelligible unless I tell you some things that he would have said.

About ten years ago the National Dental Association, realizing the fact that the majority of dental imperfections come from an unsanitary condition of the mouth, determined upon a propaganda of popular education to the end

that the public might become immune to caries of the teeth and diseases of the gums. In order to carry this work forward, they appointed a committee known as the oral hygiene committee. This committee was commissioned to go into the public schools of the land and instruct the teachers and pupils in the care of the teeth and mouth. The association, however, had no funds to place at the command of this committee. We undertook, nevertheless, to put the work into operation, by trying to engage the co-operation of the dentists throughout the land; and so we sent letters all over the country to men who were conspicuous in their associations and asked if they would go into the public schools and present the matter to teachers and pupils. I am ashamed to tell you what developed as the result of this invitation. We thought we should have no trouble in inducing our professional brethren to do this work without compensation, but we found that not one man out of ten would volunteer to do so.

There are a good many reasons for that attitude. It was not merely a matter of indifference; it was largely on account of the fact that the dental profession had not been taught to instruct the public in the care of the teeth and mouth; therefore we had no equipment, and there was none available. Neither had the profession at that time awakened to the possibilities of prophylaxis. We had not carried the gospel throughout the dental profession, and our practice was largely mechanical. We were really tooth carpenters, and saw no farther than reconstruction.

Our first purpose in a professional way was to reconstruct, to repair what had been destroyed. And so we have had a long, hard fight against heavy odds. We lacked co-operation, and we had little sympathy from the public. However, at the last meeting of the National Dental Association, in Birmingham—it was the first annual meeting, by the way, at which this committee was able to secure an entire session devoted to the subject—we held a public meeting. We had an audience of school teachers and physicians, as well as members of the association, and a number of papers and discussions on the subject were presented. As a result the Executive Council appointed a man of distinguished ability as the head of this hygiene committee, a man thoroughly in touch with the work which had been done, and who lived in the very center, you might say, of the hygiene work in the United States, Dr. W. G. Ebersole of Cleveland, Ohio. He went to work with his local society and engaged the co-operation of the newspapers of the city of Cleveland, approached the board of education, and with the co-operation of his local society secured permission of the school authorities to make an examination of the mouths of the children in the public schools of Cleveland. He also obtained permission to establish a free course of lectures in the schools of Cleveland, and as a last concession was permitted to establish four free dental clinics in four of the most prominent and largest public schools in that city. At these clinics all the children of the indigent poor can have dental attention free of cost.

The committee held a meeting last December in Cleveland, and mapped out plans for the campaign for the present year. We had a number of schemes whereby we might finance the work, because that was one of the greatest troubles. We were only partially successful in this respect, however, but we

obtained enough money to enable us to create a little interest throughout the country, and on the 18th of March the opening of the national campaign on Oral Hygiene took place in Cleveland. At that meeting we had Dr. C. W. Wille of the hospital marine service, as personal delegate of President Taft; Dr. H. C. Brown of Columbus, as the personal representative of Governor Harmon; Ex-Governor Herrick of Ohio, and Dr. W. A. Evans, health commissioner of Chicago. The meeting was opened by the mayor of the city of Cleveland, an audience of five thousand people being assembled. A number of distinguished educators from throughout the land were present, together with probably one hundred and fifty dentists, who came from long distances and paid their own expenses that they might get in touch with the work as we had planned it.

The general plan consisted, first, of having dental inspection made in the schools throughout the land. In order to do this we shall have to work through the associations of the profession, and so we have planned to undertake to induce all of the associations to resolve themselves into auxiliaries to the National committee, and to undertake to have a dental inspection made in the public schools of their localities. Many of the state associations have volunteered to do this. A triple chart record of the conditions which they find is to be made, one to be given to the National Association's committee, one to the school board, and the third to the child, to be taken home to his parents. These charts show the actual conditions of the mouth.

The examinations which have been made so far show that between ninety-six and ninety-seven per cent. of the mouths of school children need dental attention.

After the inspection is made, the next step is to establish a free course of lectures. These lectures are given also to the mothers' clubs of the city and community, and also to the public. There are three sets of lectures—one for children, one for mothers, and one for the general public. After these lectures, free dental clinics are established where all children of the indigent poor can have free dental attention.

The National committee has placed in my hands, as chairman of the Southern Branch Hygiene Committee, some funds, together with three clinical equipments to be used in this territory. These cost from $750 to $1000 each, and consist of a complete dental office outfit with the latest and most modern apparatus. Material is furnished, and each child is given a tooth-brush and a package of dentrifrice, and shown how to use it. This work is done in the local communities by the local society—that is, they give their time and the National Association furnishes the funds.

We do not propose to continue this work indefinitely; we cannot do it. We have been having a hard time to get it done for twelve months. Our proposition to the school boards is that we want their permission to go into the schools and do the work for twelve months free of any cost to the schools or to the city or to the taxpayers. At the end of that time, if we do not submit to them data which will convince them beyond the shadow of a doubt that they can afford to finance this enterprise themselves to a monetary advantage, then we will not ask them to undertake anything at all. The way in which we propose to show

that this work can be rendered profitable to the school board is as follows: We get the school record for the previous year of each child that comes to the clinic. We ascertain how many days were lost owing to illness, and if possible the nature of the illness; we ascertain the grades of study, and also the deportment of the child; we secure the child's record during the time when he has had free dental treatment and make a comparison. We propose to show in this way that we will make a saving for the school board by cutting down the list of delinquents to such an extent that the board can afford to finance this movement. Last year in the city of New York seventy thousand public school children failed to make their grades, and consequently had to be carried over for another school year. That cost the city three million dollars. With what information we have at present we have established the fact that at least forty per cent. of the absences from school are due to faulty oral conditions, not simply common toothache, but conditions which have arisen as a consequence of unsanitary conditions of the mouth. We have also established the fact that the oral conditions have a direct bearing on the deportment of the child. A child suffering from toothache or from malnutrition cannot be expected to have the same good spirits and willingness to give and take as the one who does not have such an affliction. We have already shown this to be true, and that is worth something.

The school board of Birmingham had to establish this year three summer schools. Why did they do that? Because they had such an enormous list of delinquents that they decided it would be economy to provide summer schools in which these children could make up their deficiencies, and would not have to be carried through another school term. That cost the city of Birmingham seven thousand five hundred dollars. The superintendent of education of the city of Birmingham, in discussing this measure in the newspapers, said that he accounted for this large list of delinquents chiefly by illness, and that at least seventy-five per cent. of the list would have made their grades had it not been for the time lost on account of illness. So you see, gentlemen, that this work has a very practical basis. If we get this system inaugurated throughout the land, the time will soon come when the school boards will finance it, and the poor downtrodden dentist will not have to give his time for nothing. I want this information to go abroad for a good many reasons; first, to encourage the dentist to undertake this work for twelve months, and second, to disabuse the public mind of the idea that we are after a job; and still another, to convince the school boards that we are acting in good faith.

This year I have visited on behalf of this association five or six of our southern cities as the guest of the local societies, and have given public illustrated lectures and explained the details of our plan. New Orleans, Atlanta, Nashville, Memphis, and Birmingham have agreed to undertake the work, and the matter is now up to the school boards. It is up to the local societies in each city to influence the school boards during the present vacation so that the work can go forward next winter. Lecture work has already been done in some of these cities.

We have had a long, hard, and unpromising fight, but the day is beginning to dawn. We have received encouraging letters from local societies and from individual men all over the United States.

in Canada, in Europe, in Australia, and in England, asking us to furnish them with the details of the plan upon which we are working, and to give them information which they may use in inaugurating the work in their local communities and in their several countries.

We are just now getting out an equipment. You will find in the rear of the auditorium the first oral hygiene exhibit which has ever been presented in the South—and I started to say, in the world so far as I know, but I will not make that statement, because the Oral Hygiene Council of Massachusetts has an oral hygiene exhibit; but this is the first one that has been built for this national campaign, and it was built for the Houston meeting. As it is the first of its kind you must not criticize its shortcomings, because it was sent down here for criticism and suggestions. This equipment was made by a manufacturing concern in Providence, and they are now working on an exhibit which has a mechanical arrangement for the manipulation of the tooth-brush, floss going over the teeth, and a toothpick picking particles of food from between the teeth, which will be added to the exhibit. These exhibits are still rather expensive, but as soon as we create a demand for them, and as soon as they can be made in large quantities, their cost will be reduced materially. Your committee also proposes to have made a standard set of lantern slides for the public lectures, and we have at present about two hundred from which to make selections.

I have been able to give only a very inadequate explanation of the situation as it presents itself today. At the next meeting of the National Association in Denver in July we propose to make this a national issue in the profession, and the action which is taken by the Southern Branch in Houston will determine in a large measure whether or not this movement can be carried forward to a success.

At the close of the exercises of this evening we want to submit to you for consideration a number of resolutions.

Following the address by Dr. Corley, a stereopticon talk was given by Dr. J. D. Towner, Memphis, Tenn., which was succeeded by the following

Discussion.

J. H. Foster, M.D., Houston, Texas. I wish to express my appreciation of the lectures which have been delivered to us this evening. Surely every one of us has gained much, and a great deal of good will arise from these lectures. I want to congratulate the association upon having men who devote their time and means to this splendid work of education. This work is very much in line with the work we are doing in the medical profession, and I know how hard it is to accomplish the results that we seek.

The development of the dental and medical professions is one of evolution, which is bringing the two professions more closely together, and I think in time they will be to a large extent merged. Both professions started primarily as arts, becoming sciences only later. Our work first called into use art in order to correct the effects of disease, and we learned by experience that certain measures would bring about good results in these conditions. Later the work of scientific search for the cause of disease was instituted, and as they learned more about the causes of disease it dawned upon the members of the profession that

a large amount of the suffering and disease that the human race suffered was preventable. We then came to the present era of hygiene and preventive medicine—the era in which more good work has been done than in all the past history of dentistry and medicine. As our professions have become more and more aware of the good that could be accomplished in this line, the results obtained have not been in keeping with the knowledge gained, for the simple reason that when we went to put this knowledge into effect we met with opposition due to popular ignorance. We professional men have been very slow to take a public stand. We have been too slow to put before the people our demands; we have been of a retiring nature, and it is only within recent years that we have felt that we were compelled to start a campaign of public education, and today we see good results rapidly coming.

In our own city, to some extent we have had examination of the schools. Today I was speaking of this subject with a nurse in the settlement association who has charge of the examination of pupils, and when I mentioned the fact that the subject was to be discussed tonight, she said, "You can tell the people that in the examination of schools here in the city we have discovered a larger percentage of dental troubles than anything else."

There is a bill before the United States Senate to create a department of public health, to have at its head a cabinet officer—the object being largely the prevention of disease. Senator Owens, who introduced this bill recently, showed that millions are expended every year for the treatment of preventable diseases, that millions are being spent by the state for the care of the sick who are subject to preventable diseases, and withal he presented a most masterly argument for the establishment of a National Department of Health with a cabinet officer at its head. Our popular magazines today are responding to the public pleas, and almost every month they publish articles dealing with preventable diseases. So, altogether, the public seems to be responding, and we may expect great results in the future.

Dr. Corley [reading]: "The school child whose mouth is unclean from decomposing food and stagnant septic salivary matter, due to indigestion, generally exhibits pus, exudations from irritated and inflamed gum margins, gaseous emanations from decaying teeth, putrescent pulp tissue, and chemical poisons. With every spray from such a mouth in coughing, sneezing, or even in talking or reading, the air becomes laden with microbes which are inhaled by others. Does the dental profession go beyond the limit of its province when it suggests that it is unjust to deprive the children of our schools of oral hygienic education, and as a result to continue to pay yearly toll to the death-rate from tuberculosis and other transmissible diseases to which the children of our schools are now subjected by forced predisposition?"

Dr. B. D. Brabson, Knoxville, Tenn. We have heard this great subject discussed freely today. I made a statement yesterday which it appears was misunderstood. I am not opposed to this great movement of hygiene, for I have made a study of this subject for ten years. I believe that prophylaxis is the keynote of dentistry; I believe that we will do more good in the future along that line than any other, and in view of this fact

this subject ought to be given precedence over every other subject by every dentist in the world.

I move that this association vote $500 of its funds to this committee. I also move that we appropriate from $250 to $400 for the Journal fund, and be ready to report at the meeting in Denver, where the question will come up. It is proposed to issue the first number of the independent journal in October, and I know we all want to be loyal to it.

The motion was carried.

Dr. CORLEY. I put myself on record yesterday proposing that if the association would appropriate $500 toward this movement, I would undertake to raise $500 more at this meeting. The hour is late, and most of the audience have left, but I am going to undertake to raise $250 tonight, and to make up the rest tomorrow.

We want this money to be contributed by associations and not by individuals, and I am going to ask those who represent the state associations here tonight to pledge their associations for certain amounts.

The following members pledged the stated amounts for their respective associations:

J. D. Towner, Memphis—Tennessee	$50.00
H. C. Hassell, Tuscaloosa—Alabama	50.00
Julian Smith, Austin—Texas	50.00
W. G. Mason, Tampa—Florida	50.00
W. H. Henthorne, Loraine—Texas	25.00
A. B. Carter—Dallas	25.00
M. S. Merchant—Houston	15.00

Dr. CORLEY then presented the following resolutions:

RESOLVED, by the Southern Branch of the National Dental Association, That any man should be declared ineligible to hold office in the Southern Branch of the National Dental Association who does not maintain in his own mouth a perfectly hygienic condition.

RESOLVED, further, That no dental teacher should have a place on the dental faculty unless he maintains in his own mouth a perfectly hygienic condition.

RESOLVED, thirdly, That no man be allowed to be a member of a state examining board unless he maintains in his own mouth a perfectly hygienic condition.

The President ruled that such resolutions could not be entertained by the body under the present constitution and by-laws.

Dr. WALKER. Mr. President, let us then adopt a resolution to the effect that it is the sense of this association that no man is worthy of membership in this body unless he maintains in his own mouth a perfectly hygienic condition.

(No action was taken.)

Dr. CHACE. On behalf of the association and of the Committee on Oral Hygiene, I wish to extend our hearty thanks to those who have been with us tonight, and particularly the president of the local medical society, who has favored us with an address which was very much appreciated.

Motion was then made and carried to adjourn until Friday morning.

THIRD DAY—Friday, May 6th.

THE meeting was called to order Friday morning, May 6th, by the president, Dr. Chaee, at 9 o'eloek.

The seeretary, Dr. MASON, presented a communication from the Ameriean Miller Memorial Committee.

Dr. J. P. GRAY moved that the sum of fifty dollars be appropriated to that committee. Motion carried.

Report of Committee on Operative Dentistry.

By M. S. MERCHANT, Chairman.

Dr. M. S. MERCHANT, as chairman, presented the following report of the Committee on Operative Dentistry:

To the President and members of the Southern Braneh of the National Dental Association,—I shall not make any report except that of the work done by the committee, without giving a dissertation on operative dentistry. The committee fully covered the Southern Branch territory with letters asking for papers, the chairman sending out more than three hundred letters himself, and receiving about fifty replies, with the promise of seven papers. One of these papers, however, was later withdrawn on account of the illness of the gentleman who promised it, Dr. C. S. Stockton of New Jersey. The papers which the committee has to offer are announced in the program.

M. S. MERCHANT, *Chairman.*

The next item on the program, as announeed by the Committee on Operative Dentistry, was a paper by Dr. L. P. ROBERTSON, Marlin, Texas, entitled "A Plea for the Porcelain Inlay," as follows:

A Plea for the Porcelain Inlay.

By L. P. ROBERTSON.

To my mind it is not to the eredit of the dental profession that the most important faetor contributing to the really artistie in dentistry, and a method in praetice whieh has had as mueh to do with elevating the dentist from the artisan to the artist as has the poreelain inlay, should be permitted to fall into the background and to sleep the sleep of the almost forgotten past, by many who are perfectly eompetent to do this class of work, but fail to appreciate its beauties and importanee. The poreelain inlay has formed the true distinction between dentistry as a fine art and dentistry as a mechanical art—and certainly there is something more in dentistry than simple meehanies. This paper is written for

the purpose of advocating a keener appreciation and closer observance of the ideal in dental art. We must constantly aim for high ideals, and our ideals are useless unless we make them keep pace with progress. It was only a few years ago that porcelain held the attention of the dental world, and everything written on the subject was eagerly sought and read.

VARYING POPULARITY OF PORCELAIN.

At that time, porcelain was the enlivening feature of all the dental meetings. At the Fourth International Dental Congress, held in St. Louis in 1904, the majority of the clinics consisted in demonstrations in porcelain, and the clinicians in porcelain attracted most of the spectators, who were all charmed with the beautiful work done by these artists in producing beautifully natural colors in porcelain. After years of struggle against much adverse criticism, porcelain had forged its way to the front and established its place as the crowning glory of the dental profession in this wonderful twentieth century of progress and achievement. This condition gave promise of a full fruition of the hopes that many had cherished for years, of establishing dentistry upon a higher and more esthetic plane by restoring the teeth to that symmetry and beauty which nature had stamped upon them before they were marred by disease. It has been said that the highest attainment of art is the concealing of the art, and if we would maintain our claim as artists, it is incumbent on us to do something to check the tendency on the part of some operators toward neglecting or abandoning porcelain, the real foundation upon which we can base such a claim.

THE ESTHETIC MERITS OF PORCELAIN.

There is still too great a display of gold, which constitutes a serious offense against esthetic taste. For more than twenty years we have been confronted with the unsightly gold crown, and for a longer period with the conspicuous gold filling, that mars many otherwise handsome faces. Is this stamp of disgrace to remain on our profession with only an occasional feeble protest? The disfiguring brand is no longer placed upon the horse. Is not the human face entitled to as much protection against being disfigured as the horse? While it is not the purpose of this paper to dwell upon the merits of the porcelain inlay as a substantial or durable filling, still this plea for its more extensive use would be without force if we could not show by experience that in its proper place it fulfils the requirements in that respect.

PRACTICAL EXPERIENCE AS TO THE DURABILITY OF PORCELAIN.

I can already hear some say that from an esthetic standpoint porcelain is the ideal filling, but that from a practical standpoint it is a failure. Let us see if that is the case. Dr. W. A. Capon of Philadelphia makes a very comprehensive report of his experience with porcelain in a paper published in the *Dental Cosmos* for September 1908 under the heading "Porcelain After Eighteen Years," giving a detailed description of the condition of some twenty-four cases after eighteen years of service. Some of these were large restorations involving a third or more of the cutting edges of the incisors, and some were large approximal fillings in incisors, canines, and bicuspids.

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The excellent condition of these fillings after eighteen years of service is a much stronger argument for the porcelain inlay as a durable filling than any mere statement that I can make in this paper on that point. I will state, however, without going into a detailed report of cases, that my experience and observation accord with the report made by Dr. Capon. The advent of the gold inlay and the silicate cement filling doubtless had much to do with putting the porcelain inlay in the background. but I hope and believe that the position which porcelain is occupying at present is a temporary one, as neither the gold inlay nor the silicate cement filling, in my opinion, can ever take the place of porcelain, the former for esthetic, the latter for practical reasons. We are too much inclined to go from one sensation to another, and are always looking for something easy. Porcelain work is not easy, but the difficulties are not so great as some imagine; besides, it requires skill and patience to do anything well in dentistry. And it is not the easy things we do that arouse our pride or develop skill.

INDICATIONS FOR THE PORCELAIN INLAY.

I shall briefly mention the places where I think the porcelain inlay is indicated. All labial cavities, all large or conspicuous approximal cavities of incisors, canines, and bicuspids, and all incisal edges lost by accident or otherwise should be restored in porcelain, especially in the mouths of women; in fact, in all cases where the display of gold would constitute an offense against esthetic taste. In some cases the cast gold inlay in combination with porcelain can be used to advantage by baking low-fusing porcelain on the face of the gold inlay. This latter method possesses the advantage of protecting the porcelain from chipping under the stress of mastication. It is rather difficult, however, to bake porcelain to gold so as to make a good joint.

Discussion.

Dr. Julian Smith, Austin, Texas. I not only wish to commend the essayist's paper, but also to support the ideas presented by him. Porcelain is a material which requires some experience, but the good results obtainable are absolutely beyond question. There are many difficult features about working porcelain which are only appreciated by the operator who has sufficient stability to stick to it until he can at least make more successes than failures.

I suppose that every operator who manipulates porcelain, even Dr. Capon himself, experiences a large percentage of failures, but these failures are easily corrected by renewed efforts. The failures I refer to are due to the difficulty of mixing the colors, which in many instances is a very difficult and troublesome operation. Many times we make fillings which are perfect in other respects, but which, when set in the cavity, do not satisfy the artistic eye. Therefore I call them failures, and these inlays must be made over. Any operator who does not expect to have any failures is out of his field if he takes up porcelain work.

As to the stability of the porcelain inlay, I will say that I do not believe that any class of work is more to be depended upon. When I first began to do inlay work, I experimented with porcelain for two years in the laboratory before I inserted an inlay in a patient's

mouth. After two more years, during which time I inserted many inlays in the mouth, I removed as many of them as I could as soon as the opportunity offered. As to their coming out, I will guarantee that if you dismiss a patient with an imperfect inlay, it will stay there.

Some operators contend that the cement is the weak part of the inlay. I have inserted very extensive contour fillings which did not suit me, for which reason I made engagements to make them over. Recently I made an extensive inlay in a central incisor involving one-third of the mesio-occlusal surface. I tried to take it out by my usual method of holding a little sharpened point of a tooth-brush handle against the outer corner of the inlay, tapping it with a hand mallet in the opposite direction, because all of my retention is made underneath. I used such force in the blow that the patient complained of pain in the tooth, and still the filling refused to move. Finally I had to use enough force to break the filling in halves before the cement became loose. I then drilled out the cement in order to remove the rest of the filling, the attachment being absolutely perfect.

If discretion is employed in the use of porcelain inlays, they are certainly most serviceable to our patients. The esthetic side, of course, is beyond dispute.

Dr. B. F. Thielen, Paris, Texas. I am a porcelain enthusiast myself, but, unlike Dr. Robertson, I do not believe we should ever put porcelain fillings posterior to the canines. My experience in such work has been a sad one, the patients often coming back with the porcelain inlays in their pockets. Most porcelain workers, in my opinion, are realizing that these inlays should not be placed in the posterior teeth, especially when there is any stress on them.

Dr. J. P. Gray, Nashville, Tenn. Almost all porcelain operators have abandoned the work, I think. Dr. Smith said that he often found a change in the color. We find probably just as often a change in the color of the tooth.

Dr. Smith. Dr. Gray misunderstood me. I did not say that there is any change in the color of the porcelain, but that it often occurs, when we have finished the inlay and set it in the tooth, that we find we have not succeeded in obtaining the desired color. The color of the porcelain is absolutely stable.

Dr. Gray. The natural tooth often changes in color, especially in ladies, but may return to normal again. Many of you have seen a tooth that changed after a year's time, though at the beginning there was a perfect match between the tooth and the inlay. This is therefore one of the troubles we encounter in the use of porcelain. Very few operators make perfect porcelain fillings. I hope, however, that the profession will advance to a high state of perfection in that work and do away with so much gold. Operators should be cautious in placing gold anteriorly to the molars, if such fillings will show to any extent. In our practice of extension for prevention we exhibit too much gold, and we should in my opinion modify the extension just enough to establish a contact point, and not cut clear to the labial surface and extend the cavity for the sake of convenience, as is so often done. I do not believe that it is at all advisable to put in porcelain inlays posteriorly to the canines if there is any stress. In the buccal cavities in bicuspids and molars the inlay may be successful.

Dr. ROBERTSON (closing the discussion). I appreciate the generous manner in which you have received and discussed my paper. This subject is important and should not be lost sight of. We should lend encouragement to those who have taken up porcelain work and who think that it is not a success. They can be convinced, I am sure, that it can be made a success.

As Dr. Smith said, the esthetic feature is beyond dispute. Even though we do not succeed in perfectly matching the porcelain with the natural tooth, in most cases we so nearly approximate the colors that the inlay is not noticeable at the distance of conversation. That is not the case with gold, which can be seen as far as the eye can reach.

As to the objection made in regard to putting porcelain in the bicuspids, I admit that it is very difficult to place and maintain a porcelain filling posteriorly to the canines, and it is only in extreme cases, where there is great loss of structure on the mesial surface of the buccal wall, that there is any necessity to do it. In such cases I have been able to employ the method suggested in the latter part of my paper, *i.e.* baking low-fusing porcelain on the conspicuous surface of a gold inlay after casting. Very little porcelain is required, as it is not necessary to have a very thick layer of it at that point. We can take a wax model, carve out a little of the conspicuous surface, mesial or buccal, and after the gold is cast, bake a little low-fusing porcelain to that surface, which will show up very nicely. In making a cast gold inlay that is to receive a porcelain veneer, it is absolutely necessary to use non-oxidizable gold, because porcelain cannot be baked on a gold alloyed with anything that will cause oxidation. Such an inlay should be made of pure gold, or of one of the non-oxidizable golds on the market.

The next order of business was the reading of a paper by Dr. G. S. STAPLES, Sherman, Texas, entitled "A Warning Against Dental Fads," as follows:

A Warning Against Dental Fads.

By G. S. STAPLES.

As we all know, the human family is naturally inclined to fads and fancies, but it sometimes seems to me that the dental profession is worse in that respect than all other professions put together. I therefore would like to sound a warning. I have been practicing dentistry for forty-three years, or nearly that long, and have seen many radical changes in that time. In fact, I may say I have seen the profession revolutionized several times, and in those revolutions we have never failed to note the fad idea.

THE GOLD-FILLING FAD.

For instance, about the time when I began practice the idea was in vogue that gold was the only material to fill teeth with, and so we filled teeth with gold and robbed ourselves and our patients, and didn't do nearly as good work in hundreds of cases as we could have done with amalgam, with a great deal less expense to our patients and with more profit to ourselves. That was the first fad.

THE CROWN AND BRIDGE WORK FAD.

Then came crown and bridge work, which has been the greatest fad and the worst fraud that has ever been imposed on a long-suffering and patient public, and still the wretched work goes on, to the everlasting shame of the dental profession. When crown or bridge work is called for in our practice, there is nothing that will take its place, but I honestly believe that in more than ninety-nine per cent. of cases an amalgam filling instead of a crown, or a small plate instead of a bridge, would be much better.

THE INLAY FAD.

Now comes our latest and worst of fads—the inlay. There are hundreds of operators who seem to be perfectly wild on the subject of inlays; in fact, they apply inlays in every case. Some of these operators could not make a good gold filling, and yet they seem to think that they can make good inlays. Again I would sound a warning. My advice is to drop all fads, and take time to consider what is best for each patient. When the operator has decided regardless of money consideration, then he may go ahead and do the work, and then he will have done his duty.

The truth of this whole question is, that when the teeth need a crown, a bridge, or an inlay, nothing else will take its place, and when a dentist uses discretion in such cases, he is serving his *clientèle* as he should.

Discussion.

Dr. L. P. Robertson, Marlin, Texas. We Texas dentists owe Dr. Staples a great debt of gratitude, for he has acted as a balance-wheel for the young enthusiasts for the twenty-six years during which it has been my privilege to be associated with him.

I do not feel willing to allow this paper to pass without speaking a word of commendation for the splendid points that the essayist has brought out. A number of years ago Dr. Staples demonstrated the possibilities and the limitations of the amalgam filling, long before the gold crown was in use in this country, and his observations have been worth a great deal to me, and I am sure many others have profited by his advice. One of the most important features of our work is accuracy and thoroughness, and the essayist has set for the dental profession the highest standard in these points, his results showing all that could be desired.

Dr. Julian Smith, Austin, Texas. I feel entirely in accord with Dr. Staples' statements on this subject. There is no man in the dental profession with whom I would rather confer than with him.

It seems to me that while thoroughness is one of the crowning attributes of success in dentistry, as Dr. Robertson said, next and possibly equally important is the idea which Dr. Staples advanced throughout his paper; that is, conservatism—the right thing in the right place. The gold crown has probably done more damage to the dental organs of the people at large than any other class of work. Occasions arise where we cannot use anything else, but in many cases good work can be done without the gold crown. Teeth are too often sacrificed because crowns are easy to put on and somebody is willing to pay for them.

Dr. Staples says that inlays are used too much, and while he knows that I

am one of the most enthusiastic advocates of the gold inlay in this state, as from the beginning, I am pleased to be able to inform Dr. Staples that I never put a gold inlay in the front of the mouth. The inlay is a good filling, and porcelain inlays are especially indicated in the anterior teeth.

Dr. Staples (closing the discussion). My paper, as I said, was intended to bring out discussion, and I think my friends have said nearly as much as can be said on the subject.

I am not radically opposed to inlays of any kind, or crown and bridge work when it is called for, but my purpose was to demonstrate that the human family is prone to fads. My idea has always been, and is now, that the weakest point in human nature is lack of judgment. We all are too prone to run off at a tangent without thinking a moment, and that accounts for so many inlays, crowns, and bridges in uncalled-for places. The average dentist is like the average citizen in any business; if he has anything to do, he does his work right away, and thinks about it afterward. I have tried all my life—and I get radical sometimes on some subjects—to be conservative in dentistry. When a case presents, the first question I ask myself is, What is the best thing to do in this case? Then I do the work, but never decide what is best afterward.

In our town of Sherman nearly one hundred dentists have practiced since I have been located there. One of the best men that has ever been there, and one of the best operators in Texas—I tell this as an illustration of the way in which we lack judgment—came to me one morning with a model of the mouth of a boy of fourteen years of age, whose teeth he was going to straighten. I looked at the model and saw that a bicuspid had recently been extracted. That dentist had first extracted that tooth, and then had taken an impression and commenced to study the case. He brought it to me as soon as he had obtained the model, and wanted advice on the subject. I asked him if he had extracted the bicuspid because it was carious. He assured me that the tooth had been perfectly sound. When asked for his reasons for the extraction, he stated that he wished to secure enough room to get the teeth straight. In ten minutes' time I showed him how, if he had regulated the teeth as he should have done he would have had enough space for that tooth; as it was, he had a surplus of space. Such after-thinking is done in all branches of dentistry, therefore we must get the profession to timely thinking.

The next order of business was the reading of a paper by Dr. J. E. Storey, Beaumont, Texas, entitled, "Some Things in Operative Dentistry," as follows:

Some Things in Operative Dentistry.

By J. E. STOREY.

THOUSANDS of papers have been written on the subject of operative dentistry, and were it possible for every paper that has been written to have made an operator in addition to those who are born operators, then a world of good would have been accomplished, and time and printer's ink would not have been spent in vain.

JUDGMENT IN OPERATIVE DENTISTRY REQUIRED.

Judging from the fillings seen in the mouths of patients who present themselves at our offices, we know very well—if we ourselves are acquainted with operative technique—that not one dentist in every one hundred knows how a tooth should be filled. He knows, or thinks he knows, how to stuff "amalgum" in a hole that decay has started for him. He knows nothing of cavity preparation; self-cleansing surfaces and extension for prevention are beyond him. He knows a bur when he sees one because his supply man has told him what a bur is; he believes it will cut because he has been told so. You can bet he will not allow that bur to do its proper work. It is not timidity that holds him back, but simply lack of judgment.

CORRECT USE OF INSTRUMENTS.

Are our cutting instruments to be used as ornaments? Not by any means. Burs, chisels, hatchets, and excavators by their very names alone tell their use. They are inert bodies, and must have power given them to do their work. A good and strong foundation is the only hope of success, and if we ever hope to become operators we have to know how to use our instruments to advantage. Yet in all we do we must use brains. We should utilize our intelligence in filling teeth; our filling materials are only a means to an end, and without brains they are worthless.

FILLING MATERIALS AND CAVITY PREPARATION.

We have three kinds of filling material that recommend themselves by their permanence—porcelain, gold, and amalgam. I mention porcelain first because of its beauty and durability when placed where indicated, *i.e.* in the anterior teeth; yet there are anterior teeth that cannot be filled with porcelain with any hope of success. Such teeth are those that have become worn until they have an end-to-end bite. Here gold is indicated, service being the first object, regardless of beauty.

Porcelain. As to cavity preparation, porcelain requires a cavity without undercuts, clear, well-defined margins, allowing the matrix to draw easily and in no way become distorted. Good color and a proper bake will produce a result that justly evokes the operator's pride and the patient's delight. It is impossible to state how long porcelain should

be fired; that depends on the furnace and the material used. Furnaces do not bake alike, even though of the same make. The matrix can be prevented from warping in large restorations by varnishing the margins. A better color and less brittle fillings can also be obtained by long bakes at a low temperature.

Gold. For gold inlays, cavity preparation is about the same as for porcelain inlays, only that margins are made broader.

For gold fillings good undercuts, strong walls, and clear margins extending to self-cleansing surfaces are required; all cavities should be extended to such surfaces, no matter what material is used. The gold should be packed in small pellets, annealed well, but never directly over the flame, and the finish should be made with No. 30 gage gold, which will give a splendid filling free from pits, and one that will not absorb the secretions.

Amalgam. Amalgam is one of the most difficult filling materials to manipulate properly, and for that reason alone so many poor amalgam fillings are made, though the best of amalgam may have been used. We find such fillings bulging, loose, discolored and discoloring the tooth, and in every conceivable condition caused by lack of knowledge in the manipulation of the material. Amalgam has a larger sphere than it is given credit for. There is hardly a tooth on which a gold crown is placed that cannot be beautifully restored with amalgam, giving comfort and permanence rarely found if gold crowns are employed. An amalgam filling should never be placed in an approximal cavity without using a matrix.

Silicate cement. You will notice that I have refrained from mentioning silicate cement as a filling material. My reason is that I do not class it as such. I have found from experience that it will not live up to the promises made for it. The fault may lie with me, yet I have been forced to discontinue its use.

CONCLUSION.

I could go into details as to cavity preparation, but will not, as I have found that one cannot obtain a very clear idea of such matters from a paper. No matter how well this subject may be presented, the little details are lost, and it is the little details in operative dentistry that make for success or failure. It is the clinic that broadens, and gives the real idea of how a certain work is performed. Description is never so good or forceful as actual demonstration. This is my reason for believing that few papers hit the bull's-eye. The gray matter of one observer is not so receptive as that of another. The majority of us are imitators, not inventors. We must see how a thing is done before we ourselves can do it. In conclusion, I would say that every filling, be it temporary or permanent, must be polished. Close attention must be paid to details, and the operator must see to it that every piece of work leaves his hand in such a condition that he will not be ashamed to have it inspected by another.

Discussion.

Dr. M. S. Merchant, Houston, Texas. Dr. Storey gave his consent to read a paper very reluctantly. As he said, he is not trying to teach anything new in his paper, but wishes to make thoughtless men think. There are some points in his essay which are instructive to the oldest of us.

Dr. C. M. McCauley, Merkel, Texas.

I should like to add a word of commendation to this paper on operative dentistry. If it does no more than teach us that thoroughness is of prime importance in the work of operative dentistry, we could expect no better lesson from a paper of that length. It is clear that the essayist is a careful and painstaking operator, who exercises judgment in his work.

If I were to take issue with regard to any point in the paper, I would do so with the statement that all cases of discoloration from amalgam fillings are caused by carelessness on the part of the operator. I do not believe this to be a fact. No doubt a great many cases are caused by failure to remove all the carious portions, or by imperfect condensation, which allows the carious process to continue. In such cases a space is soon created between the filling and the tooth structure, and discoloration results. In my judgment more of these cases are caused by the defective formulas which are followed in making the alloy. The filling contracts after it has been packed in the cavity and leaves a space for the entrance of such elements as will discolor the tooth structure. An amalgam containing a too small proportion of silver will contract. A silver-tin alloy containing less than seventy-two and one-half parts of silver will contract. An alloy which contains seventy-two and one-half parts of silver and twenty-seven and one-half parts of tin will neither contract nor expand, according to Dr. Black. I therefore believe that in a great many cases the discoloration around an amalgam filling is due to shrinkage of the mass, resulting from the manufacturer's error in putting in too little silver.

Dr. G. S. Staples, Sherman, Texas. While I commend my friend's paper, I do not agree with him in regard to the cause productive in the majority of cases of the discoloration of teeth filled with amalgam. In my opinion the majority of cases of discoloration of the teeth from amalgam is due to lack of carefulness. Many operators do not clean the tooth properly and do not prepare the cavity properly, because they are in too big a hurry to finish the filling and receive their dollar—which, I think, is the price the majority get for these fillings. I do not make any dollar fillings. I cannot do it and do myself justice. Only recently I was working for an old patient of mine, one of the leading lawyers in our city, when another patient came into the operating room and said that Dr. So-and-so would put in amalgam fillings for a dollar. My friend, on whom I was operating, said, "A man who would put in a filling for a dollar should not look in my mouth." That is my own sentiment. When an operator takes enough time to do this work carefully, there will be no more discoloration, which in my belief is generally caused by the operator, and not by the amalgam.

Dr. H. B. Holmes, Louisville, Ky. I am not a member of this association, but I am very glad of the opportunity to say how much I enjoyed Dr. Storey's paper. I came all the way from Louisville to attend this meeting, and I have enjoyed nothing that has come before the association since I have been here more than I have this paper. If this is the essayist's first effort, he has a brilliant future before him as a writer of essays. His paper is difficult to discuss because it is replete with axioms, and he is evidently not one of the men Dr. Staples spoke of who lack judgment.

The portion of the paper that interested me particularly was the subject of

amalgams. Amalgam is one of our most permanent filling materials and the most terribly misused one. We see more faulty amalgam fillings than porcelain or gold inlays. This is not always, however, the fault of the alloy, but lack of care and thoroughness both in the preparation and in the manipulation of the material. I hold that an amalgam filling should be condensed as thoroughly as we endeavor to condense gold fillings. If we do not use sufficient force on an amalgam filling, we may expect failure, it matters not what alloy we use. The essayist has pronounced another axiom when he said that we should never put an amalgam filling in the interproximal spaces without the aid of the matrix. Such a filling cannot be made successfully unless we have a supporting matrix.

Dr. Staples spoke of amalgam as being one of our fads. I do not agree with him that we should consider the use of amalgam and gold as fads. Amalgam is certainly one of the best materials we have. No dentist can afford to make proper amalgam fillings for a dollar, because in most instances two sittings are required, as the filling cannot be polished at the time it is inserted unless the patient remains for some time in the chair. The patient has to return for final polishing, which is very essential for the success of an amalgam filling.

Dr. Guy Morgan, Paris, Texas. One of the chief causes of failures of amalgam is the fact that dentists use amalgam fillings when they cannot use anything else—as, for instance, when the walls are too weak to hold any other filling, and when patients are not able financially to have better work done. For the latter reason, however, amalgam saves more teeth than any other filling material.

One feature, particularly, is of vast importance in the use of amalgam, *i.e.* these fillings should be polished and finished as carefully as gold fillings. Unfortunately hardly one man in five gives these fillings such careful attention. In a great many instances I have been able to give the patient excellent service by using this material instead of a gold crown, and a much better condition resulted than if a gold crown had been placed on the tooth. I wish to commend the essayist's paper very highly.

Dr. J. D. Towner, Memphis, Tenn. I wish to add my commendation of the papers of both Dr. Storey and Dr. Staples, as they both treat a similar subject. I wish to say of Dr. Storey's effort that it has impressed me that you have discovered a rising star in Texas, whom we should heartily encourage to future efforts.

There are two points in the paper that impressed me strongly: First, the essayist's strong advocacy of intelligent, honest, conscientious dental service, the discharge of the operator's moral obligation to the public, and of his honest duty to himself. Be conscientious, and above all things, be true to yourself! Two elements enter into dentistry, as distinct as they possibly can be—one is the purely professional and the other is the purely business feature. I mention this because some reference has been made to the consideration of fees. If you attempt to mix the two, you are going to make a failure of both. With the conscientious purpose in view of serving your patient to his best advantage, you yourself must be the sole judge of the recompense to be received for your efforts. You must be the master of the situation, and the patient has no right to dictate what the fee shall be. First

settle the financial part, gain the confidence of the patient, and then resort to the operative procedure necessary. The moment you look into a cavity and see the dollar mark, you have invited failure before you touch an instrument to the tooth. Before you attempt any filling operation, study the conditions presented, as you cannot fill a tooth in one mouth in the same way as in another. If you operate regardless of the conditions present, those that will have an important bearing upon the permanence of your work, you become a mere mechanic. Any man who can pour sand in a rat-hole can fill a tooth, but he cannot fill it properly.

That brings us to the consideration of the operative procedure in amalgam work as touched upon in Dr. Staples' paper. I am an inlay advocate, and use gold and porcelain inlays almost exclusively. I do not make inlays because they are more easily made and bring a higher fee, but because I believe that an inlay properly made is the best filling possible, while, on the other hand, a poorly made inlay is absolutely the poorest excuse for a filling. If you are going to make an inlay, make it properly—you then have what is dependable and is a pride to yourself and your patient.

I especially wish to discuss the subject of amalgam. I make very few amalgam fillings, but when I do I exercise great care. Reference has been made to the discoloration of the filling material and the tooth structure. In view of the discoloration of the material, the operator should familiarize himself in his laboratory with the working properties of an amalgam before selecting it definitely. Amalgams mix differently; good formulas mix differently, and good formulas have different effects when used by different men; but one cause of discoloration lies in the condensation of the material in the cavity. The amalgam must be packed properly, and unless a pressure of forty pounds is produced with a flat instrument on every particle and every surface of that filling, it will not be perfect. The filling must be properly condensed, and is then less apt to be discolored than if it is slopped in. In mixing amalgam the same factors enter as in mixing cement, though not so much in regard to permanence as to form and discoloration. If in mixing amalgam an excess of mercury is avoided, and the material is well mixed and packed properly, the filling will retain its shape and will in many cases be permanent. That permanence will of course depend on the thoroughness with which the cavity has been prepared.

The main issue, however, is the discoloration of the tooth. If an amalgam filling is inserted into a thoroughly dehydrated cavity, it will not discolor the tooth. The trouble is that too many amalgam fillings are inserted without the proper exclusion of moisture. It is used too often like a submarine filling material, and, even though moisture is kept out to a certain extent, operators rarely go to the trouble of making the cavity as dry as it can possibly be made. Dryness must be obtained to avoid discoloration and also to prevent the slight disintegration of the tooth structure just underneath the contact layer of the filling. If you will remember these two things, you will have less trouble with amalgam fillings.

As to the polishing of the filling, no filling that is not polished is complete. Amalgam fillings must be polished as

thoroughly as gold ones if the filling is expected to be as useful, as comfortable, and as permanent as it should be.

Dr. Pitt S. Turner, Belton, Texas. I wish to say a few words for the benefit of the young men present. I do the dental work for a large woman's college, and I see work from all over Texas, the South, and even some northern states, which brings up the question of cavity preparation as emphasized by Dr. Storey. The larger percentage of dentists, in my opinion, make proper cavity preparations, and I see in the mouths of these girls and young ladies gold fillings in cavities with a preparation that is perfection itself. I study these cavity preparations for my own benefit, as they show judgment, accuracy, and perfection. The fillings are finished in the same way. But I also often find amalgam fillings of such poor quality that if my office boy could not do better after a week's time in the office, I would dismiss him. That is a strong statement, and I believe I have made it once before on the floor of the Texas Dental Association, but yet it is true. And why? These amalgam fillings have been inserted in cavities that were not prepared with the same care, judgment, and painstaking effort used in the preparation of the cavities for gold, and therefore failure is the result. During the past session I have been strongly impressed by this observation, because no less than one dozen young ladies from that school have come to me with aching teeth that in every instance had been filled with amalgam just before they left home. Usually in the bicuspids and molars the filling is left too full, the gingival border is left overhanging, the gum is being irritated, the tooth sore, and the cavity preparation faulty in every step. Yet, as I said before, in the same mouths I found gold fillings that any of us would be proud of.

I would advise the young men in the profession to be as thorough and as painstaking in the preparation of teeth for amalgam as if they were going to put in a diamond filling, and above all things not to leave the filling too full, so as to disturb the proper articulation. I have often found that the filling has been left bulging out in such a way that it looked like the top of a biscuit. Amalgam fillings must be finished as perfectly and with the same care as gold fillings.

Dr. Storey (closing the discussion). Gentlemen, I have hardly anything to say in closing, except that my heart is overflowing with gratitude for the manner in which my effort has been appreciated.

The next order of business was the reading of a paper by Dr. H. M. Davidson, Hubbard, Texas, entitled "Cavity Preparation for Gold Inlays," as follows:

Cavity Preparation for Gold Inlays.

By H. M. DAVIDSON.

Cavity preparation is one of the most important subjects the dentist is confronted with. A large percentage of our failures can be attributed to deficiency here. Whatever material be used, we should consider well the mechanical retention and the amount of stress that will be exerted by the occluding teeth.

MERITS OF THE GOLD INLAY.

As the gold inlay is one of my hobbies, I will confine myself to a discussion of the preparation of cavities for gold inlays. The gold inlay has a practical place in dentistry; it can be used to advantage, and when sound judgment is employed, no other modern method of filling can be compared with it, where properly indicated. I am sure that teeth are being filled with inlays where it should never be attempted. That, however, is the fault of the dentist and not of the method. The durability of the gold inlay has passed the experimental stage, as some men in our profession have been using this method for years. In one case I inserted an inlay eighteen years ago, and it is still in good condition today. There is no other available method that would have saved that tooth so well. I have used for years the Alexander method of burnishing platinum foil in the cavity and melting 22-k. gold plate without using a flux.

SOME MISTAKES.

It is not the intention of this paper to give the technique of the many methods that can be employed. I rather wish to call your attention to some of my mistakes. From these I hope the younger members of the profession, especially, will derive some benefit.

BEVELED MARGINS.

One of the mistakes I made at first was the preparation of cavities with square margins. I had been making porcelain inlays, and I would find myself preparing the cavities for gold inlays in the same way. The margins should be well beveled for a cast as well as a burnished filling. By making beveled margins I obtain a thin lap of gold that can be burnished to the tooth, so that there is practically no cement line. I have noticed that in shell crowns with perfect adaptation, when for some reason they had to be removed, the cement was almost as hard as stone, which is conclusive evidence to my mind that the gold inlay, if properly adapted, will give the same results.

OCCLUSION.

To my sorrow, I have made the mistake in some cases of letting the occluding teeth bear too hard on the inlay or abutment. The operator should be sure, after the cement has set and the margins have been well burnished and polished, that no undue pressure is brought to bear on the inlay by any movement of the jaw.

GOLD INLAYS IN INCISORS.

We often find in anterior teeth that have carried a foil filling for years, that the cutting edge is worn down, and a part of the anchorage is worn away. These teeth offer an ideal place for a cast inlay. With a thin carborundum wheel the walls are made parallel and enough of the tooth on the lingual surface is ground away for anchorage, allowing the cavity to extend slightly over the incisal edge. I claim that there will be no more display of gold than there would be in a foil filling, a much better contact, and a wearing surface that cannot be excelled.

RESTORATION OF INTERPROXIMAL SPACES AND CONTACT POINTS.

Bicuspids and molars with badly broken walls that have moved together

until all interproximal space is gone, I would separate if possible, and if I could not secure enough space, I would make a separation with base-plate gutta-percha and wait for months, if necessary, to get interproximal space and contact points.

GOLD INLAYS IN BICUSPIDS.

We often find bicuspids with caries on both sides, extending nearly through the tooth. Here I would true up the walls, grind off the cusps and bevel, and if the caries extended so deep that I should destroy too much tooth surface, I would dry the tooth, fill it with cement, and proceed to prepare it so as to encounter no trouble in withdrawing the pattern.

INLAYS AS ABUTMENTS.

I often use the inlay for abutments. I had a case two years ago, in which the upper right central and lateral incisors were missing, the left central was filled on both sides, and the canine was in the same condition. The lower teeth occluded very high up, which gave me plenty of room for the backings. I saw this case again a few days ago. There is very little display of gold, and no irritation at the gum line, as would have resulted from a Richmond attachment. The all-gold or window crown in such a place is a disgrace to the dental profession. There is less pain connected with the preparation of this class of cavities, as nearly all of the cutting can be done with stones. By using a high pressure of compressed air, there is very little pain.

NECESSITY OF DRYING THE CAVITY.

Another point I want to emphasize is the advantage of thoroughly drying cavities. I saturate the cavity with absolute alcohol and turn on 30 lb. of air for about two minutes. If you will pay more attention to this matter, you will have fewer loose inlays. My attention was called to it by one of the dental journals some time ago, in which it was stated that when an inlay came out, the cement would adhere to the gold and not to the tooth. I am sure that in such a case the cavity has not been thoroughly dried.

CONCLUSION.

This subject has been receiving the attention of the best men in our profession. This is not surprising, when we consider the great number of ill-fitting gold crowns that in the past have been inserted.

The next order of business was the report of the Committee on Pathology, Materia Medica, and Therapeutics, by the chairman, Dr. W. A. Dean, Tampa, Fla., as follows:

Report of Committee on Pathology, Materia Medica, and Therapeutics.

By W. A. DEAN, Chairman.

THE Committee on Pathology, Materia Medica and Therapeutics begs to submit the following report:

To give a comprehensive report of any one of the three great branches named above would require more time than this body could give to its consideration. To treat them all, we necessarily have to touch briefly a few of the many features that require the careful study of all who are interested in the practice of dental surgery. That we have made rapid progress in our particular field within the past few years no one can gainsay, but that the field remains wide for a more thorough scientific investigation, particularly within the realm with which this committee has to do, is a fact that needs no emphasis with the thoughtful and well-informed practitioner.

THE ORAL PROPHYLAXIS MOVEMENT.

Just as many dread maladies have fallen before the rationalism of the science of general medicine, so will the many conditions of the dental organs and the oral cavity, which are no less a menace to the health and happiness of the race, give way to the science and skill of the dental and oral surgeon. The medical world today has not only banished forever the idea of heredity in the "great white plague"—phthisis—but has pronounced it curable. It has treated, empirically, "tropical anemia" for decades, and today "hook-worm" succumbs to well-directed or rational treatment. Just so are the many diseases of the oral cavity and dental organs to be controlled. Pyorrhea alveolaris, long pronounced as an incurable disease of the dental organs, is today at the mercy of the skilled hand and the rational therapeutist.

Our beloved associates, Drs. Corley, Walker, Towner, and Griffis are today knocking at the door of this association, standing at the threshold of the dental schools of this country, and pleading gently with the medical boards of every state in the Union for an audience in behalf of oral prophylaxis. This once given and the *régime* thoroughly instituted, with our students then not "ground out," but thoroughly equipped and "graduated" from our dental schools, particularly in the branches and allied branches with which this committee has to do, we will be approaching the goal toward which this association has been looking since the day of its organization.

It is the province of every dental surgeon or dental therapeutist not only to restore by artificial measures the lost organs in the dental arch, but to keep normal the natural teeth. The latter prerogative every thoughtful practitioner would say is the wiser course to pursue. To do this, we are forced to go beyond the cavity in the tooth—the mere physical sign that presents for our consideration.

Underlying the symptom is the cause,

and we must find it if we are to attain to that perfection that is hoped for by the profession.

A BROADER DENTAL EDUCATION.

I have sought diligently to find the line of demarkation between "dental education" and that laid out for the student of general medicine, as regards these branches particularly, and I find that I cannot separate the two. In fact, in order to recognize the many pathological conditions that arise for which there is no visible cause, we must of necessity have some source from which we may derive a logical conclusion as to why such conditions obtain.

All cases, therefore, of dental disorders not attributable to unsanitary conditions or direct infection, we must admit are of constitutional origin, and must be fought on these grounds. Not only are some of the disease conditions of the teeth and the oral cavity of constitutional origin, but it is being made clearer to us each day that many of the constitutional ailments are directly traceable to the germ-life that has its culture medium in carious teeth. Until we recognize these conditions, at least as far as has been revealed both by the medico-dental investigator and the general practitioner, we may justly be called incompetents.

A specialist in any line must of necessity have a broader horizon than the circle in which he moves. He must have a thorough knowledge of all subjects contiguous to the one with which he has to do, else he is handicapped, and grows narrow, with the result that he becomes a mere machine. Who can conceive of a criminal lawyer attempting that specialty without a knowledge of the fundamental principles that underlie all law? The farmer of today who knows not the composite element in which he plants his seed is living in the remote past, and is doomed forever to "horny hands."

In this connection my mind runs back to the principles advocated by the late J. Y. Crawford, and I am sure the solid South would turn an eager ear to this most loved of all our southern educators of dental surgery. Dr. Crawford taught that no specialist needed a more thorough knowledge of the fundamental principles of medicine than the doctor of dental surgery.

The average dental student of today has no higher ideal than to make "false teeth," plug the cavities that may present, make a bridge now and then, and possibly reach the high plane of skilfully constructing an orthodontia appliance. These are all well and good if the conditions demand them, and it is likely that in all ages we will find the need for them, but it is time for a higher ideal to be set up by those whose province it is to teach.

Along with the emphasis laid on mechanical and operative dentistry, let them give the students more prescription writing, a more thorough training in physical diagnosis; train them thoroughly in urinalysis, analysis of the oral secretions, etc., and the students will rise to a higher plane and will at once recognize the fallacy of plugging away, at the chair or in the laboratory.

RECENT DENTAL PUBLICATIONS.

Without wishing to make this too lengthy, I shall call attention briefly to a few of the articles and books that are of more than passing interest to us.

For our knowledge of the late publications we are indebted to our monthly

magazines, all of which give a brief account of these books.

PRINZ'S DENTAL MATERIA MEDICA.

To satisfy our plea for more therapeutics, Dr. Hermann Prinz of St. Louis comes to us with a new book "Dental Materia Medica and Therapeutics, with Special Reference to the Rational Application of Remedial Measures to Dental Diseases." This is the first edition of this book. It is new, up-to-date, and is recommended to all who would keep abreast of the times. As the title of his book indicates, Dr. Prinz takes the rationalistic attitude in his development of the subjects within his book. This is in keeping with the rationalism that has almost revolutionized the older methods of the application of drugs.

MAYRHOFER'S BALSAM OF PERU TREATMENT FOR PUTRESCENT PULPS.

Another book which we are pleased to report to this body, is one by a German investigator and writer, Dr. Mayrhofer, dean of the University of Innsbruck, entitled "Principles of a Rational Therapy of Gangrene of the Pulp." He deals at length with the treatment of the root-canals and concludes that they will re-infect themselves from the tubuli, since the agents in use today lose their antiseptic and disinfectant qualities. From this point of view he criticizes Dr. Buckley's method of treatment with tricresol and formalin, but gives us a remedy, not yet verified by sufficient use to be perfect, but theoretically an ideal root-canal filling, especially in posterior teeth. He advocates balsam of Peru c. p. for the following reasons:

(1) It is a lasting antiseptic, (2) does not volatilize, (3) is not absorbed, (4) does not discolor the teeth, (5) is easy to introduce, (6) is easy to remove, and (7) has no irritant action on the tissues if it gets beyond the foramen.

BUCKLEY'S MATERIA MEDICA.

Dr. Buckley's book, "Materia Medica and Practical Therapeutics" (second edition), needs honorable mention in this connection. Dr. Buckley, having been before the dentists of this country so long, needs no eulogy as to his ability as a writer and investigator. It has not been the pleasure of the chairman of this committee to see Dr. Buckley's book, nor a review of it by any of the journals, but we are all more or less acquainted with many of his treatments. We have the pleasure of reporting an article by him read before the Northeastern Dental Association, Providence, R. I., October 7, 1909. We reproduce the following formulas as given in that paper:

SOME USEFUL FORMULAS.

No. I. Devitalizing paste:

℞—Arsenic trioxid,	ʒj	
Cocain,	gr. xx	
Thymol,	gr. v	
Lanolin, q. s. to make paste.		M.

No. II. After-treatment before removing pulp:

℞—Menthol,	gr. xx	
Thymol,	gr. xl	
Phenol (95 per cent.),	fʒiij.	M.

Thymol is used because of its favorable action on dead animal tissue. Buckley lets this dressing remain ten days, then removes it, and fills the canal.

Dressing for putrescent pulps.

No. III. Treatment for putrescent pulp, and abscessed teeth; the old "bone

of contention" criticized by Dr. Mayrhofer in an article in which he referred to Dr. Buckley's method:

℞—Cresol,
Liq. formaldehyd. āā f℥j. M.

This is designated by Dr. Buckley as a specific for putrescent pulps.

Bismuth paste for chronic abscesses.

No. IV. Another remedy, discovered by Dr. Beck of Chicago, but given in this connection by Dr. Buckley:

℞—Bismuth subnitrate, 30 per cent.
Vaselin, 60 " "
Paraffin, 5 " "
Wax, 5 " "
Mix while boiling.

This remedy is used in cases of chronic abscessed conditions that do not heal under the ordinary methods of treatment. In cases where the skiagraph shows denuded roots with no pericemental attachment in the apical region, instead of extraction the root can be amputated and the resultant pocket thoroughly curetted, and packed for a time with Euroform paste on gauze (another of Dr. Buckley's specifics) for the purpose of controlling the pain. After a sufficient time has elapsed the paste is removed and the subnitrate paste is forced into the cavity with a specially devised syringe. The syringe containing the paste should be warm so as to slightly soften the paste. Sufficient of the paste is forced into the cavity to fill it.

Euroform paste for pain from exposed processes and denuded surfaces.

The Euroform paste is given the following formula and is also classed as a specific by Dr. Buckley, its action being that of controlling pain resulting from exposed processes and denuded surfaces:

℞—Europhen,
Orthoform, āā ʒj
Liq. petrolatum, q. s. to make paste.

"TECHNIQUE OF URINALYSIS."

"Technique of Urinalysis," another book to which I am pleased to call your attention, was written by another German author, Dr. Guttmann, a practicing dentist in Berlin. This author comes to the relief of this committee in its plea for a greater knowledge among dentists of the fundamental principles underlying the medical science. The *Dental Cosmos,* April 1910, says of it: "The recent advance in systemic diagnosis and treatment of dental diseases, and the close affinity between internal medicine and dentistry are authenticated in Dr. Guttmann's book, which in a convincing manner proves the necessity of a knowledge of urinalysis for the dentist."

Under the head of papers written especially for this meeting we are pleased to report the following:

(1) "Practical Dental Therapeutics," by Dr. H. B. Holmes, Louisville, Ky.

(2) "Clinical Experience and Observations in Pyorrhea Alveolaris," by Dr. W. O. Talbot, Biloxi, Miss.

The next item on the program was the reading of a paper by Dr. H. B. Holmes, Louisville, Ky., entitled "Practical Dental Therapeutics," as follows:

Practical Dental Therapeutics.

By H. B. HOLMES.

VERILY we are living in an age of development and progression. If one wishes to spend a quiet hour in reminiscence, let him consider the advancement made in the various sciences and professions during the past decade, or let him delve farther back, and contrast professional methods and scientific principles as he first recognized them and as they appeal to him now.

The sciences and the various professions were not like Minerva, who sprang ready armed from the brain of Jupiter. They were the children of time, and have been formed insensibly by the collection of the methods pointed out by experience, and at a late day by the principles deducted from the combinations of those methods. Thus old men whose prudence caused them to be called to the bedsides of invalids, and whom compassion taught to cure wounds, were the first physicians.

The shepherds of Egypt, who observed that certain stars, after the lapse of a certain period of time, met in the heavens, were the first astronomers.

The person who first uttered in simple language the truth that 2 plus 2 equals 4 created mathematics, that mighty science which really placed man on the throne of the universe.

In the course of the last half-century, many new sciences have taken their place in the category of our knowledge, and old ones have so broadened and lengthened and taken on new coloring and dignity as to be unrecognizable as their former selves. About that time dentistry appeared as a distinct profession, and its development along its every line has been almost phenomenal. In fact, all sister sciences have made way for it. This is, of course, but a natural result, as all sciences cultivated for a long while must advance, especially as the art of printing makes retrogression impossible.

It is true, possibly, that for awhile knowledge which had been gained was guarded as secret, confined possibly to only hired attendants. If these methods of experience and research had continued to be kept in cellars, and where dispensaries were written, the results would have been very much hampered. But fortunately such days are past, and we are constantly studying, working, and forging ahead to improve ourselves and to raise the standard of our chosen profession, be that what it may. That is the reason we are assembled here today for mutual improvement, to increase our professional fund of knowledge, and to better prepare ourselves to treat the patients who present for our services. We gather at these meetings mainly for two purposes—to give and to receive instruction. Not a man before me has a professional secret; in fact, the proudest man here today is he who has the most information to divulge to his professional brother. This is why our profession has made such remarkable progress and development.

Our growth has been noticed by the laity as well as by ourselves, and how

often do we hear from those of our patients who are past middle life remarks like this: "My, doctor! how differently you do things now from the way you once did." Have we advanced? Think of our porcelain inlay with its naturalness, its beauty, and its estheticism!—the silicate cements, so closely resembling nature as to defy detection; the gold inlays, which in the last decade have been rendered indispensable as fillings and abutments in bridge work! Think of the wonderful value of oral prophylaxis as it is practiced today, and of the inexpressible value of applied therapeutics as now taught and practiced!

EMPIRICAL VS. RATIONAL THERAPEUTICS.

"Therapeutics" has been defined as the application of drugs or remedies in the treatment of disease, and dental therapeutics differs in no way from general therapeutics, except in its limitations, being confined to the treatment of the diseases of the mouth and the adjacent structures. This, then, is our calling, our life-work, and it is of such grave importance that every one of us should be interested.

The term therapeutics has been variously subdivided; we will mention only two of those divisions. Empirical therapeutics relies upon observation rather than upon theory; this is a manner of quackery without science, or the treatment of disease conditions in a haphazard, unscientific manner. Rational therapeutics is based on reason; the rational therapeutist cares more for the cause of a disturbance of general organic functions and less for the name of it. The rationalist is not satisfied to know that certain results may be obtained by the use of certain medicines in certain diseases, but he wants to know that they *will* be obtained, and *why* such results are brought about. Have we been guilty? Are we now ever guilty of empiricism in treating the various oral diseases? If I should ask that he who is without guilt cast the first stone, not a missile would be hurled. But of this, too, I am equally sure, namely, that the tendency of dental therapeutics today is to place the treatment of disease upon a rational basis. For this we are very much indebted to Dr. J. P. Buckley of Chicago, whose work and research has been a very great factor in this direction. From him we learn that there are three essentials upon which all successful therapeutics rests: First, "to be able to recognize a pathologic condition and make a correct diagnosis"—if we fail in this, all else must of necessity be unscientific; secondly, "to know what drug or remedy, if properly administered or applied, will reach the recognized pathological condition and act most favorably"—hence the importance of our possessing a knowledge of pharmacology, which is the science of the action of drugs upon the organs, the functions, and the tissues of the body; thirdly, "that we have at hand, in a convenient and practical form, that drug or remedy which experience has taught us will assist nature in her efforts to restore a diseased condition to a normal one." Practical therapeutics may be discussed from so many viewpoints, as related to any number of abnormalities, that it is a little difficult to decide to what particular disease we should concentrate our efforts in a paper. I have decided, however, to discuss the usual rather than the unusual, the pathological condition that we meet daily rather than occasionally, and the trend of the discussion shall not be toward dis-

coveries especially new, but rather toward the technique of administering and applying drugs which have an established scientific value. For I am fully convinced that often, when a failure in producing a therapeutic effect is experienced, it is the fault of the technique and not of the agent employed.

TREATMENT OF PUTRESCENT PULPS BY RATIONAL THERAPEUTICS.

We will consider hastily the treatment of putrescent pulps, for this is a condition of daily occurrence, and one with which every practitioner should familiarize himself. It is in just such treatments that we have been most guilty of empiricism. The only way in which we can scientifically apply medicinal agents in treating the above-mentioned condition is to have some definite knowledge of the intermediate and end-products resulting from the putrefactive process.

GASES IN PUTRESCENT CONDITIONS.

Gases in putrescent conditions. In the preparation of this paper I looked up the word *putrescent* in a "Universal Dictionary of the English Language." I found there that it meant the decomposition of organic substances, and that it differed from fermentation mainly in being accompanied by the evolution of fetid and noxious gases, which the dictionary named as ammonia and hydrogen sulfid gases. Dr. Buckley in his recently published text-book makes a similar statement. In the beginning of this paper, when in speaking of scientific advancement, I should have mentioned as a notable example the chemistry of gases; who knows if the chemistry of gases will not ultimately overcome those as yet rebellious substances, mingle and combine them in proportions not as yet attempted, and thence produce substances and effects which would remove many restrictions of our powers? We have learned from sad experiences that in the process of pulp decomposition some gases are evolved which, if confined, produce severe pathological disturbances, on account of the pressure exerted, thereby forcing the infectious material through the apices of the roots into the surrounding tissue, resulting in infection, septic pericementitis, and, in many instances, alveolar abscesses. A decade ago I was taught never to hermetically seal a cavity when treating a putrescent condition. We were told to leave it open so that the gases might escape, else we might expect swelling and pain. For a long time I did not dare to seal up a putrescent canal, and every time I failed to do this I made three vital mistakes—in that the oral fluids were constantly contaminating the medicine within the tooth, the medicine was escaping into the patient's mouth, and the tooth was changing color during the process of treatment. To prevent these undesirable conditions, every putrescent tooth should be sealed with cement at the first and at every subsequent sitting.

Formaldehyd. It has been proved that these gases are present, and it now becomes necessary to dispose of them in order that we may hermetically seal the cavity. It has been shown by such men as Cassidy, Buckley, and others that formaldehyd is a valuable therapeutic agent if properly employed. This gas is dispensed in a 37 per cent. aqueous solution, which solution is recognized by the U. S. P. of 1900 as liquor formaldehyd or formalin. We are taught that the gas unites with ammonia, producing a

substance, or solid, known as urotropin. It also unites with hydrogen sulfid, forming methyl alcohol, a liquid, and sulfur, a solid. It is also said to unite with the basic ptomains, forming inodorous compounds. We conclude, then, that by the use of formaldehyd the irritating gases and poisonous liquids (largely ptomains), which are the result of pulp decomposition, can be changed into non-irritating and non-poisonous liquids and solids.

Diluting agents for formaldehyd. As we all know, formaldehyd is too irritating to be used alone, and must be diluted with some other agent. For this purpose one may use cresol, phenol, or creasote. If we use either of the last two agents, however, we shall have to further dilute with a small amount of alcohol in order to clear the solution.

Cresol. Cresol is recommended as the preferable diluent, for four principal reasons: First, it is miscible with liquor formaldehyd in all proportions, thus making without the addition of alcohol a good pharmaceutical product, from which formaldehyd gas is constantly generated; second, it is of itself a good disinfectant, much more powerful than phenol; third, it possesses anodyne properties, thus modifying the irritating action of the formaldehyd, and fourth, it has a chemical action upon the fatty compounds present in the tooth, thus disposing of them to advantage.

Specifics for dentists. Our medical brothers are fortunate in having what are known as specific remedies, or remedies which can always be relied upon to produce a therapeutic effect, such as antitoxin in diphtheria, vaccine in smallpox, quinin in malaria, etc. Why cannot we have specifics in dentistry as well? I am fully convinced that formocresol is a specific for putrescent pulps. The writer has used it for two years with universal satisfaction, and believes that whenever trouble arises, the fault lies with the operator rather than with the agent.

I would not always hermetically seal the cavity of a tooth when treating a putrescent pulp, for drugs selected merely on account of their efficiency cannot inhibit the growth or destroy the vitality of micro-organisms. But when formocresol is employed we have a remedy which chemically converts the noxious products of decomposition into substances which themselves possess antiseptic and disinfectant properties; and we not only can but should seal it in hermetically, thereby getting the full benefit of the drug and preventing discoloration by the ingress of the fluids of the mouth.

TREATMENT OF PUTRESCENT DECIDUOUS TEETH.

Another phase I would mention is that of putrescent deciduous teeth, for we now realize that their conservation is very necessary. After having gained the confidence of the little patients, which is an all-important first procedure, I have them use some pleasant-tasting antiseptic solution as a mouth-wash. As an adjunct to the formocresol remedy I use the precipitated calcium phosphate (another suggestion of Dr. Buckley's), mixing these ingredients to the consistence of a thick paste. This paste is packed into the pulp-chamber, and keeping the cavity as dry as possible, a quick-setting cement is flowed over it. It is remarkable how abscesses will heal and remain quiet—provided, of course, that no complications arise, such as caries or necrosis of the bone. If, however, a

tooth is to be conserved for several years, it might be better to neutralize the putrescence with the formocresol remedy, after which the root-canals can be flooded with the Eucapercha compound.

EUCALYPTOL VS. OIL OF EUCALYPTUS.

In the filling of canals it is the practice of many dentists to moisten the canals with eucalyptol before introducing the gutta-percha cone, as this agent is known as a solvent for gutta-percha. Care must be taken here to use eucalyptol, and not oil of eucalyptus, as this oil is highly irritating, and has been the cause of many cases of acute apical pericementitis. The writer had this experience once, when it became necessary to extract the tooth on account of the severe pain.

The property of eucalyptol may be modified and its antiseptic value enhanced by adding menthol and thymol, Buckley's prescription being—Mentholis gr. ij, thymolis gr. iij, to a fluidounce of eucalyptol. This is known as the eucalyptol compound, and while less irritating, is equally as good a solvent for gutta-percha as eucalyptol or oil of eucalyptus.

IMPORTANCE OF PROPER ROOT-CANAL FILLING.

There are so many different methods of filling root-canals that one hesitates to discuss this operation, which is of extreme importance, and if carelessly done, may result in severe pericementitis. There is possibly more pericementitis produced by root-canal fillings than by any other mechanical irritant. In filling canals we should be absolutely certain that the canal is aseptic. If there is any doubt as to its aseptic condition it must not be filled. If there was ever an illustration of "haste making waste," it is here. In order that the color of the tooth may be retained as much as possible it must be kept perfectly dry. In filling canals, following the treatment of an alveolar abscess, the great danger lies in forcing materials through the apex, for there being no live tissue at the immediate end the patient can feel no pain there; but when new granulations occur and this space is filled with new tissue, it comes in contact with the foreign material which had been forced through the naturally enlarged opening, and the result is a recurrence of pericemental trouble.

The secretary, Dr. Mason, presented a number of applications for membership, which on motion were accepted.

The next paper on the program, as announced by the President, was a paper by Dr. C. M. McCauley, Merkel, Texas, entitled "Oxyphosphate Cements," as follows:

Oxyphosphate Cements.

By C. M. McCAULEY.

The field of application of oxyphosphate cements has been increasing from time to time since their first introduction. They have been rapidly growing in favor, and since the advent of the cast gold inlay, they have become quite indispensable. On account of the almost universal use of some of the phosphates

in cases where an adhesive cement is required, this paper will be devoted entirely to this class of cements. The importance of this material to every practitioner of dentistry is more forcibly impressed as one considers the matter carefully from the standpoint of utility. We hardly realize its full import until we have enumerated the vast number of operations in which a cement is used, and realize that in each operation the quality of the cement means so much in the matter of service and satisfaction to the patient and gratification to the operator.

TESTS FOR THE SELECTION OF CEMENTS.

The purpose of this paper is not to try to advance any new ideas in cement manufacture or production, but to remind you of some of the vital points you once knew and have forgotten, to give you the results of some investigations in the form of practical tests made by the author, and to impress you with the importance of ascertaining for yourself whether your favorite cement is really the best. Quality means much in the outcome of every operation in which cement plays a part. Practical tests are easily made in your own office. Porosity, expansion, and contraction are among the most important features distinguishing the good from the bad in the cement market. You think you are using the cement which produces the best results in your hands, but do you know it? The avoidance of the embarrassment consequent to one failure due to an inferior cement is sufficient compensation for the time and expense required to make your own tests.

Cements differ in composition in elements and proportions. These differences require different manipulations. Your style of manipulation might be more suited to one brand of cement than another. The accompanying tests were carefully made by the author, and in each case the cement was manipulated as nearly as possible according to the directions inclosed in the package. The results are not favorable to the brand of cement with which the writer has had most experience in his practice.

CREDIT DUE TO THE MANUFACTURER OF CEMENTS.

The increasing demand of recent years for a good cement has stimulated the manufacturer to strive for perfection in his product. Only to a limited extent has he realized the end toward which he is working; perfection has not yet been attained. He has traveled a long and rocky path, bordered by many failures and discouragements, and has only reached the point where in the dim distance he can catch an occasional glimpse of light radiating from the goal toward which he is striving. We should be ungrateful were we to censure him for not having reached this goal already, when, in my opinion, he has earned our gratitude in reaching the heights which he has now attained toward the pinnacle of cement manufacture. I dare say the manufacturer has done his part in the production of cements equally as well as the dentist has performed his work in the study of their nature, composition, and manipulation.

NECESSITY OF PROPER MANIPULATION.

Not only would a universal study of the merits of the different cements stimulate an improvement in the quality of

the material, but it would also improve the skill of the operator in its proper manipulation. A vast deal depends upon the manner in which the spatula and slab are used. An inferior cement well mixed is more dependable than a good cement poorly mixed. The importance of correct manipulation and the fact that this cannot be so well attained without some knowledge of the ingredients entering into this chemical compound, impels us to briefly review these points.

CHEMICAL CONSTITUTION OF CEMENT.

The ingredients of cement before mixing are a powder of zinc oxid and a liquid of phosphoric acid, both in their unmodified form. After mixing these two, we have a new chemical compound which contains zinc oxid and zinc phosphate, hence the name—zinc oxyphosphate. The amount of acid used is not sufficient to dissolve all the zinc oxid, so an excess of zinc oxid granules is left which acts as a base for the oxyphosphate compound, and the zinc phosphate formed by bringing the powder and liquid together acts as a cementing medium, which holds together the excess of zinc oxid granules contained in the powder. Hence we have zinc oxid for the body of the cement, or enamel-rod substance, so to speak, and the zinc phosphate for the cement substance. The quality of enamel depends not upon the enamel rod but upon the cement substance, so also the quality of a cement does not depend so much upon the zinc oxid as upon the quality of its cement substance, viz, zinc phosphate. Zinc oxid is insoluble in the fluids of the mouth. If the cement substance which holds its granules together is insoluble, the result is insolubility.

THE CEMENT LIQUID.

Pure phosphoric acid and pure zinc oxid unmodified are not used in the commercial cements on account of their harsh-working and quick-setting qualities, and moreover from the fact that different colors are desired. Smooth working and slow setting are obtained in some cements by using glacial phosphoric acid in solution for the liquid. Such a cement is of an inferior quality, for the following reason: The zinc oxid granules are held together by the double phosphate of zinc and sodium, the glacial phosphoric acid being pure phosphoric acid, with uncertain amounts of sodium phosphate added to give it the glassy form for commercial purposes. This cement substance is porous and unstable; it naturally follows that the cement will be of a porous nature. If the liquid is modified with the phosphate of some of the non-alkaline metals, such as copper, magnesium, aluminum, or silver, the desired working and setting qualities are obtained and the quality of the cement is not impaired.

THE COLORING AGENTS.

Likewise different colors in the powder may be produced with materials which do not detract from the good qualities of the formula. Formerly pigments were produced by the use of such materials as calcium oxid, silica, and alumina, all of which are inert or even detrimental to the combination. It has been found more beneficial to use a substance for pigmenting which will form a cement when treated with phosphoric acid. Such metals as gold, silver, copper, and mercury, in the form of their oxids, will furnish all the necessary shades, and at

the same time will form a cement when treated with phosphoric acid in the same manner as will the zinc oxid. The inevitable conclusion seems to be, if the foregoing statements are correct, that the better cements possess such modifications as the phosphates of non-alkaline metals in the liquid and the oxid of the cement-forming metals for producing the desired shades.

FACTORS DETERMINING THE PROPER SELECTION OF CEMENTS.

If we would be successful in the selection of a good cement we should avoid the following properties, namely, solubility and porosity, marked expansion or contraction, and weakness.

Solubility. For inlay purposes possibly solubility and porosity should be most avoided. Good strength is very desirable, yet we should never depend upon the cement to hold the inlay in place. The successful, lasting inlay is the one which is held in position by the shape of the cavity. We have great faith in the gold inlay placed in such a cavity and cemented with an insoluble and non-porous cement.

Porosity. Porosity is caused by crystallization toward many centers, leaving an innumerable number of small spaces in the mass. Shrinkage occurs when the mass crystallizes toward one center only. Porous cements never shrink in setting. Cements which shrink in any marked degree are non-porous.

Expansion and contraction. Expansion in cements is caused by taking in water of crystallization during the setting process, thus increasing the mass. Contraction is caused by giving off residual water during the hardening process, reducing the volume. Expansion may be prevented by adding water to the formula to satisfy the demands of the crystallizing process; contraction may be prevented by depriving the formula of its surplus water. Thus a perfectly balanced formula, as regards expansion and contraction, may be had by supplying the formula with the proper amount of water. This perfectly balanced formula has been found to set too rapidly for practical purposes. It has proved more satisfactory to deprive this formula of a certain amount of its water in order to enhance its working qualities, and allow the mass to take up some water during the setting process to supply the demands of crystallization. A cement of this kind must not be kept dry while hardening, but must be subjected either to the fluids of the mouth or water. A cement of this kind is called hydraulic or submarine.

Strength. Strength of a cement depends upon the modifying elements in the liquid and the size of the granules in the powder. The finer grain powders show more strength than the coarser.

Adhesion. Adhesive properties are governed by the shape of the crystals as regards the irregularities of the surfaces to be cemented. If the crystals are so formed as to permit their knitting into the minute recesses of the surfaces cemented, other qualities being good, we have the maximum degree of adhesion.

Setting. Setting is hastened by the addition of water to the liquid, the presence of heat, or by the fine grain of the powder. Setting is retarded by the addition of phosphates to the liquid and by absence of water and heat. A given

cement will set more slowly in a cold or dry atmosphere than in warm or moist surroundings.

Crystallization of the liquid. Crystallization of the liquid is caused by overloading the liquid with phosphates in solution to procure desirable working qualities, strength, etc. Care must be used to prevent this, as such crystallization is quite detrimental or even disastrous. When a liquid is used from the original bottle, crystallization is often set up around the cork, where it comes in contact with the air. This formation may reach the liquid in the bottle and cause material injury to the properties of the cement. The possibility of such damage may be done away with by transferring the liquid from the original bottle, upon its first being opened, to a glass-capped bottle of the style of the S. S. W. preparation bottles. It may then be transferred to the slab with a small dropper in such quantities as are needed. For practical use this is more economical and convenient than the original bottle. If you have not adopted this plan, I would heartily recommend its trial.

PROPER MIXING AN IMPORTANT REQUISITE.

Proper mixing is one of the most important points requisite for a good cement. Time should be allowed for the necessary chemical action, and cleanliness should be strictly observed. A multitude of failures are due to careless and improper mixing. With some operators a good mix is an accident; with the careful operator, who understands what he is doing, a good mix is the rule.

For example, we shall assume that the mixing is begun with pure phosphoric acid and zinc oxid, to be spatulated together. The chemical action that follows is the formation of zinc phosphate. There is never enough acid to change all the powder; if it were so, the result would be a mass of zinc phosphate, or, by comparison, the same as dental enamel would be without the enamel rods. There would be no base left to give integrity to the mass. Instead, only a part of the zinc oxid is acted upon, leaving the rest to act as a base for the cement. The zinc phosphate formed seems to act as a cementing medium to hold these zinc-oxid granules together. The mixing, therefore, should be so performed as to have enough zinc phosphate to properly cement together the remaining unchanged granules of zinc oxid. In order to accomplish this result, the first stage of the mixing should progress slowly, allowing time for the necessary chemical action to take place. It is during the first stage that the zinc phosphate is formed.

TECHNIQUE OF MIXING.

The technique recommended by some of our best manufacturers is as follows:

Secure a large glass slab, clean and dry, and a broad spatula made of German silver. Steel is bad on account of the detrimental effect of the iron phosphate formed. Place the powder and liquid on the slab a convenient distance apart. Bring a small quantity of powder into the liquid and spatulate well, until a perfect solution is apparently formed. Allowing time at this stage assures the necessary phosphate for the cement substance. After this first addition, the work may be carried on a little faster. The rest of the mixing, up to crown and bridge or inlay consistence, should con-

sist of from eight to ten portions of powder, each being spatulated thoroughly before bringing in the next portion. The mixture should then begin to work heavily, and when dropped from the spatula it turns loose somewhat slowly and ropes as it falls to the slab. Creamy consistence is a little thin; if it leaves the spatula in drops, it is too thin. One of the most common errors in mixing cements seems to be too thin mixing.

MIXING FOR A FILLING.

If a filling is to be made, put aside enough of the mixture at this point to line the cavity; this increases the adhesion. Continue adding the powder as before but a little faster, until the mixture becomes very stiff and works heavily under the spatula, sometimes tending to curl up behind it. The cavity should not be too dry for best adhesion. Dry well with cotton. Dispense with the hot air, as the small amount of moisture left in the tubules will help to supply the water of crystallization, which has been left out of the formula and which must be supplied during the setting process.

If an inlay or crown is to be set, moisture should be kept away only until the hardening has well begun. Then the fluids of the mouth or water should be brought in contact with the cement. Fillings should be immediately subjected to moisture after roughly shaping, and finished a little later.

CEMENT TESTS.

Tests have been carefully made in four of the leading commercial cements, namely, Fellowship, Harvard, Petroid, and Ames. In each case care was used to follow the directions accompanying the package. Ames, Fellowship, and Petroid are recommended as hydraulic cements. These three were subjected to water as soon as the setting had well begun. Harvard is not claimed to be hydraulic, so the varnish accompanying the original package was used to prevent the moisture from coming in contact with the cement. About twelve hours after the cement had been placed in a small tube and immersed in water in a bottle, red ink was placed in the small tube above the cement. These tests were begun practically sixty days ago, the mixing all being done between February 25th and March 5th. The results are very plain as to expansion; close inspection will be required in order to distinguish between shrinkage and porosity.

Mix No. 1 was made thin as for setting inlays, No. 2 was made thick as for fillings. The hydraulic cements, especially mix No. 2, should not be censured for some shrinkage that occurred toward the top of the test tube, as water was only allowed to come in contact at the bottom. Lack of water here would cause slight contraction.

The result as shown, comprising all the tests made, is subject to your inspection and criticism. Only five of the tubes show results which can be regarded as entirely satisfactory. All of these tubes contain Ames' cement, mix No. 1, and show no expansion or contraction, and are free from pores.

Discussion.

Dr. B. F. Thielen, Paris, Texas. I want to congratulate the essayist on his paper, for it is a most excellent and timely one. His experiments show up

some of these cements in a very bad light. We must admit that the ideal cement has not yet been formulated. We have thought we had it. Archite illuminated the dental firmament for a few hours, but like a meteor passed into darkness and oblivion. The silicate variety came heralded as the long-sought ideal filling material, but—a little while, and they, too, will pass to an untimely end, unloved and unsung.

Considering the various and complex conditions that exist in different mouths, I doubt whether an ideal cement will ever be discovered. The essayist has made some interesting tests for porosity, expansion, and contraction, which have their value, but can we say with absolute certainty that these phenomena will occur in the same way in all mouths with their differences in temperature, in reaction and chemical make-up of saliva? Until we can conduct these tests in the mouths of different individuals the question arises, Should we condemn a cement because it behaves in a certain way in pure water when placed in contact with red ink, which might perhaps contain some chemical that has a peculiar affinity for a combination such as these cements contain? I saw a patient the other day who has in her mouth two cement fillings that were put in seven years ago, and though they show some disintegration, they are practically in good condition and preserving the teeth. These fillings were made from a cement that the essayist's tests condemn. On the other hand, I have set porcelain inlays with the cement that makes the best showing, and seventy-five per cent. of them had to be reset.

I do not believe that cement will adhere better to a moist surface than to a dry one. My experience has been that I have greater success by maintaining absolute dryness. A cement may become as hard or harder in the presence of moisture, but it will not adhere as well, and when I set a porcelain inlay I put the rubber dam on, and after the cement has hardened, varnish the surface before allowing moisture to come in contact with it. When I set a gold inlay or crown or bridge, I wipe the cavity or abutments with alcohol, dry with hot air, and keep moisture away until the cement has set. I do not believe that we should depend on cement as a filling material, except in temporary operations.

The essayist's suggestions in regard to caring for the bottle and mixing the mass are excellent, and should be practiced.

I do not believe that the best results can be obtained by mixing cement on a paper pad, as I have seen some dentists do, but a heavy clean slab and a very strong stiff spatula should be used to thoroughly incorporate the powder with the acid.

I feel that we owe Dr. McCauley a vote of thanks for his work along this line, and I trust that he will be encouraged to continue it and at some future time make tests for adherence.

The next order of business was a paper by Dr. B. F. Thielen, Paris, Texas, entitled "The Duty of the Dentist—Is He Fulfilling It?" as follows:

The Duty of the Dentist—Is He Fulfilling It?

By B. F. THIELEN.

I DO not presume to come before you as a muckraker, nor as a faultfinder, but as one of the younger men in the profession who has "observed, compared, reflected, and recorded," and has found some defects in our practice that ought to be corrected.

It is my privilege to give you this message, and your privilege to do with it what you will. I trust you will receive it seriously and discuss it freely, so that all of us may be profited by whatever good it may contain.

Every man who enters a profession, especially one that has to do with the treatment and repair of human tissue, assumes a great and solemn duty. The Standard Dictionary defines duty as "The course of conduct, whether active or passive, that one is morally bound to follow; what one ought to do; that which is right."

When the dentist opens his office door and invites the public to come in and be healed, he signs a moral contract to give to the public the very best service that it is possible to obtain from one engaged in his specialty. The public assumes that he is qualified to perform such service, and it behooves every one of us to qualify himself in every way to render this efficient service.

I ask you frankly, Are we as a profession, fulfilling this duty? Are we doing the most efficient work possible? Or is dentistry

A little boring with a bur or two,
A careless mixing of a plastic mass,
A plate or crown or bridge half blundered through,
The case dismissed to suffer more—alas! ?

I will say, without fear of successful contradiction, that upon careful examination of all the mouths we see, seventy-five per cent. give an affirmative answer to the latter question.

This is an appalling condition. Think of three-fourths of all the work done in this part of our common country being labeled "careless." And by careless work I mean all dental work by which the teeth are not restored to their normal condition, shape, contour, and usefulness. How many well-made, properly contoured, and polished amalgam fillings do you see in the mouths of people who come to you? How many well-made crowns and bridges upon well-prepared abutments do you see? How many of these are performing the function of the teeth they are intended to restore, with all surrounding tissue in normal condition? Is it not a fact that you so seldom see perfect or nearly perfect work that you remark upon it to your patient when you do? How many of you devitalize the teeth you crown? And you know full well that 95 per cent. of the teeth we crown cannot be properly prepared without removing the pulps. How many of you are still using antiquated methods in devitalizing and treating teeth and filling root-canals? How many of you maintain strict asepsis in treatment of root-canals?

What surgeon would perform a laparotomy, or even a minor operation, under other than aseptic conditions? And yet we, who claim to be specialists of medicine, open up a pulp-chamber and treat it without even applying the rubber dam, allowing myriads of bacteria to flow in

and out, and then wonder why pericementitis or alveolar abscess is set up. Ours is just as exact a science as that of the surgeon. Why should we not isolate a tooth, sterilize it and all instruments—and by sterilizing all instruments I mean boiling burs, broaches, and all others used in the operation—before entering the pulp-chamber, and if we maintain strict asepsis, why should we hesitate to fill the root-canals immediately any more than a surgeon would hesitate to sew up a wound after an operation performed under aseptic conditions? Why should we still use the antiquated method of devitalizing pulps, and often injure the tissue beyond the ends of roots as well as gum tissue, when we can remove practically all pulps with pressure anesthesia and fill the canals at once, if we maintain proper asepsis? This method is as far in advance of the old as the present methods of surgery are ahead of those of forty years ago—yet the majority of dentists are still using arsenous oxid.

How many of you seal up a pulp-chamber with cement after filling the root-canals? I am one of those who believe that it is not the filling itself of the root-canals that renders our work permanent and successful, but strict asepsis, the careful filling of the canals, and after this, the sealing of the pulp-chamber with cement. And just so long as metallic fillings are placed upon soft root-canal fillings will we have abscessed teeth and careless work. I believe that the operator who fills root-canals with any patent abscess cure root-canal filling that remains soft, and places a metal filling on top of this without sealing it with cement, neglects his duty to his patient, only to reap a crop of abscesses in due season. I perused a paper that was read before a dental society by a dentist who is a member of a state board of examiners, in which he stated that he filled root-canals with a mixture of zinc oxid, iodoform, and oil of cloves, and that it hardened in the root-canals—and, strange to say, not one member of that society took issue with him! It reminded me of a statement made before the state dental association by some member, "that it was all right to cast gold to a platinum post, but that there was danger of melting the post." That statement went unchallenged, though we know that it takes an oxyhydrogen flame to melt platinum.

Only a few days ago a patient—a priest—came to me who was wearing a bridge. The abutments on which this bridge was resting had been devitalized and filled with one of the patent remedies mentioned. Both teeth were abscessed, and there was a sinus leading from each, discharging pus. The root-filling was as easy to remove as so much mush. How could it be expected that these canals would remain aseptic?

How many of you sterilize your instruments, or even have a sterilizer in your office? By sterilizing I do not mean dipping the instruments in some antiseptic solution, nor do I think it necessary to have a fancy apparatus with "sterilizer" in box-car letters written on it, stand where your patients can see it for advertisement only; but I mean boiling the instruments as a surgeon should, and this can be done in a tin pan at the extravagant outlay of ten cents. I believe it to be the duty of the dentist to sterilize all instruments in this manner after each use. Not only should he care for his instruments, but his entire office should be neat and clean, his bracket-table should be covered with a

material that can be scrubbed, and his cabinet should be in keeping therewith.

Not long ago, after finishing the treatment of a patient who had come to me from a neighboring state, I told her, as is my custom, that it was necessary to visit a dentist at regular intervals for prophylactic treatment. She replied, "Well doctor, I'll come to see you when I am in Paris. I balk when I get to the door of a dental office at home." Is that an uncommon condition? And we are members of a profession that advocates cleanliness above all other things!

PLATE WORK.

In making artificial dentures, how many of you reserve the necessary time, take the impressions, make the models, and carry the work to completion as quickly as possible? You know that plaster changes in shape, and if you take the impressions today and complete the plates several days later, the fit will not be exact. And—what is worse!—how many of you send your work to some laboratory man? He may be a competent dentist, but how can you expect him to know anything about the patient, his general appearance, and other characteristics? Of course you can select teeth that will fit after a fashion, but I ask, in the name of dentistry, is that ideal, efficient service? Is that doing your duty? What do you think of a dentist who will order from a depot a set of teeth for a lady, forty-five years of age, and send no models or other information? This is no exaggeration, it is often done, and if you don't believe it, ask the depot man.

It is the duty of the dentist to keep up with his profession in order to render efficient service, and there is no excuse for not doing so, with the high-class journals and literature available at present. Yet a layman who had sold medical and dental works of the highest class all over this country remarked to me: "Why is it, doctor, that so few dentists buy scientific works, or even read the journals, while physicians in the remotest places keep right up with their profession?" I had to admit that he was correct. I had to acknowledge that the majority of the members of my chosen profession were not progressive, that they were not doing their duty.

Right here I am going to quote from one of "Brother Bill's" letters:

> After I became sufficiently prosperous so that I no longer feared that I might be tempted to advertise, I examined quite a few advertising dentists and their offices. I'll have to whisper it under my breath, but exactly the same conditions prevail among them as do in ethical offices. On a certain street in a city I know of are several dental offices. The practitioners in some are not excelled by any living men in skill or faithfulness to the interests of their patrons. A few of the others are so incompetent that no amount of faithfulness would avail anything, and at least one is so crooked that no amount of skill would make any difference. And all of them are as ethical as one could wish. It's what's in a man's heart that makes the difference between the honest man and the crook, and up to date I haven't been able to see that being ethical makes a dentist either skilful or honest, or that advertising makes him either unskilful or dishonest.

A few thoughts in verse will not be out of place here:

> Love thy work!—
> Let heart and brain and hand
> Together stand,
> And life will cease to be
> Monotony and drudgery.

Then conscience true
Should join the other three,
And with this trinity
Bring love and joy combined
And peace to soul and mind.

Success, it seems to me,
Is not fame nor hoarded wealth,
But give me health,
Beloved work, and scores of friends—
On these happiness depends.

Is it not all the more necessary for us to keep up, for "The evil we do lives after us," while that of the physician "is oft interred with his patient."

Only a few weeks ago, a brother dentist in my town came to me and said: "Dr. Blank spoke to me the other day about joining the association. He says he has ceased advertising and wants to be ethical, but doesn't want to apply for membership until he knows how we feel toward him." This Dr. Blank, until recently, was the rankest advertiser that ever used printer's ink. He went to college one year and was graduated by our board of dental examiners, and judging from a great deal of his work that I have done over, he couldn't fill a knothole in a wooden leg with mud. This same man is vice-president and a director of a dental college, and signs his name as a D.D.S. I told my brother practitioner that he would never join the Texas Dental Association if I could keep him out. I told him to tell this man that I had said that if he would go to college and properly equip himself for the practice of dentistry, we would then consider his application.

I quote from a recent paper by Dr. Black:

I believe it is time that every man in the profession who is really in earnest should arise and condemn carelessness in the practice of dentistry. This carelessness is a terrible thing to think of. Only the other day a gentleman asked what should be done in a certain case, that of a young woman. I looked it over; she gave me her history. She was a young girl making her living with her voice, and she said that a dentist in Philadelphia had put crowns on her incisors; she then came to Chicago. Some time afterward she went to a dentist there, who brought her to me. I sent her to my X-ray man, and the X ray showed that there were no fillings in the roots of these incisors, and that pus was burrowing widely in the cancellated portion of the bone. The poor girl will have to lose everything back to the first molars. Now such carelessness makes me red-headed, and it is time the whole profession should condemn such practice. I can excuse men for making mistakes. We all do it in spite of ourselves; but such wretched carelessness as this is too bad. I hope to see the time when we will not have so much careless work.

Whose fault is it that we have such bunglers in practice? Should we not shoulder much of the blame? It is our duty to tell these frauds and to tell the public that we do not consider them competent. I do not believe that we will ever be able to legislate the advertiser and the quack out of the profession, but by doing our work well and conscientiously, and by educating the public to see the defects by comparison, we will start a crusade that will in time put him out of business:

The fault, my brothers, is not in our stars, but in ourselves, that we are underlings.

While we owe a duty to our patients, I am not unmindful of the fact that we owe ourselves a duty that is equally important. We owe it to ourselves to be paid for our work. If we devote time and study in order to render first-class service, why should we not be paid more than the man who does it in less time, and carelessly? Is not a person getting

more value for his money if you charge him five dollars for cleaning his teeth, when it takes you two or three sittings to do it, than if you gave them a lick and a promise, as it is usually done, and charge him the usual fee of one simoleon? You can get the price if you deliver the goods.

Is it not right that we should lay aside a competency for old age? No man puts more of his actual life into his work than the dentist, and no man deserves more to enjoy the fruits of his labor.

It lies with us to demand just and ample remuneration for our work. We must educate the public to appreciate our efforts. Not long ago a physician made the statement that if a man got into trouble he did not hesitate to pay a lawyer several hundred dollars to keep him out of the penitentiary for a few years, but if a doctor charged him fifty dollars for keeping him out of hell for life, he felt ontraged.

And so it is with dentistry. The patients expect us to put in a filling to stay from the birth of Christ to the death of the devil for a dollar and a half; and these same people will pay $25.00 for a spring bonnet that will go out of style in four months, and feel that they have a bargain.

No truer words were ever written than these: "If a man write a better book, preach a better sermon, or even make a better mouse-trap than his fellows, though he build his home in a forest, the world will soon make a pathway to his door."

Nor should the dentist impose upon his strength. There is no work that requires a steadier nerve and clearer brain than that of the dental surgeon, and if he is to perform this work efficiently, he must safeguard his health and energy. He ought not to work day and night, every day and Sunday, for there's

A time o' year
  Men want to go
Where rivers run
  And boughs are low,
And shuck their coats
  And sprawl around.
And smoke and doze
  On the smelly ground,
And just act like
  They gol-derned please,
Out in the country
  'Mongst the bees.

They like to sprawl
  Around and snooze,
An' shuck their coats
  And vests and shoes;
And fish a little
  Here and there,
And not git bites;
  For men don't care
To ketch no fish
  This time o' year,
They just want country
  Skies and clear.

Just a small party,
  Six or ten,
And lots of grub
  And stuff, and then
A good long hike
  'Way out of town,
Almost to where
  The sky bends down,
To tell fish stories,
  Eat and loll,
And saturate
  Their weary soul.

And so, my brothers, let us aim high, let us have ideals that will lead us to realize that—"Today well lived makes every yesterday a dream of happiness, and every tomorrow a vision of hope." Let us so fulfil our duty to mankind that we may say when we have done our best,

It matters not how strait the gate.
  How charged with punishment the scroll,
I am the master of my fate,
  I am the captain of my soul.

Discussion.

Dr. W. H. SCHERER, Houston, Texas. The essayist's arraignment of the dentist with the charge of dereliction in his duty to his patients is apparently a true bill, and I fear we must plead guilty to the charge.

Duty is a powerful word, with boundless meaning and import. It implies the natural, moral, and legal obligation to follow a certain line of conduct in our alloted work. It is the force by which such obligation controls one's will or actions, and in the struggle between duty and desire duty must triumph.

The essayist's estimate of the amount of careless, unfinished, and imperfect dentistry is a conservative one. A careful examination, I fear, would reveal a far greater percentage. We fail to perform all of our operations perfectly because they appear trifling. Our minor operations with amalgam and the plastic materials are not given the same care and thoroughness in every detail as are our major operations of gold and porcelain. Our vulcanite work is not given the same attention as our gold work. They appear menial, yet no work conscientiously performed nor material carefully manipulated is menial in the eyes of the conscience. The material which is indicated has no superior, whatever it may be, if it is carefully manipulated and if artistic and perfect results are obtained.

I cannot contradict the essayist's many charges wherein we are negligent and derelict in our duty. On the contrary, there are several more that I might mention. Do we use as much tact and patience in handling our young patients as we might? Do we instruct the parents as to the proper care of the dental organs of the child? Do we instruct the parents as to the proper care of their own teeth, thereby setting an example to the fertile brain of the youthful patient?

We fail to insist and urge upon the parent the necessity of early correction of irregularities and the removal of adenoids and obstructions in the air-passages of the child. We neglect to advocate and practice prophylaxis in our daily practice, and as a result our patient's dental organs show recurrent caries, hyperemic and diseased tissues, pyorrhea, and pus discharging into the alimentary canal, until the final loss of the teeth intervenes.

The adage that cleanliness is next to godliness, to my mind was intended for the personality of the dentist and his office. The essayist cited the case of a patient who said she balked at the office door of her former dentist. I experienced one case in which the patient said she never visited her dentist without notifying him several days in advance to clean up his instruments and office. The dental office, as that of the surgeon, should be absolutely neat and clean, stocked with snowy linen in abundance. The napkin on the head-rest, the towel, and hand-towel, should invariably be used for one patient only. An abundance of waste-baskets and receptacles for soiled linen, cotton, paper, etc., should be kept, so as to avoid dropping these bits on the floor. Glass-top surgical tables, on which can be arranged glass jars containing cotton rolls and absorbents, and glass trays for antiseptic solutions, give to the office an appearance of cleanliness.

Sterilization of all instruments is imperative. Our greatest need is to cultivate the aseptic spirit, the determination, whether we consider it necessary or not,

to faithfully carry out in every instance all the detail which shall present to each patient both ourselves and our equipment as attractive and thoroughly aseptic as possible.

The next chief detail of dental faith is the personal cleanliness of the operator. He should be the very essence and pink of purity when he approaches a patient. His linen should be clean, his person rendered irreproachable by frequent bathing, his face cleanly shaved every morning—if he shaves at all—and his hands most scrupulously cared for. How often have patients been offended by the finger-nails of the operator. No matter how many patients the operator may have in a day, he should wash his hands thoroughly and dry them carefully every time a patient takes the chair, and this should invariably be done in the presence of the patient, as the very last act preceding the commencement of the operation. There is never any precaution too great to be taken in avoiding offensiveness, of whatever character, connected with the personality of the dentist. His breath should be the object of special care. He should avoid all food material liable in any way to leave a taint upon it. The use of tobacco or alcoholics during office hours is a great, unpardonable sin, and no dentist who has any respect for himself or for his patients will commit such a breach.

Laxity in morals, also, has been laid at the door of the dentist. It is difficult to overestimate the effect of morals on daily practice and life. Even if it were possible to keep it from the public, there is a disintegration of character which goes with an immoral life, which sooner or later undermines a man's success.

Adequate remuneration should be received for our work, which is nerve-racking and exhausting. Our fees should be sufficient to enable us to live as do our fellow men and to lay aside a competency for the rainy day of old age.

Last, but not least, the dentist has the duty of being a good and public-spirited citizen in his community, which he usually neglects. He takes little or no interest in the business and politics of the city government or its departments, while other professions are usually represented.

The essayist's paper is deserving of the highest commendation; it contains food for much thought. He interprets the duty of the dentist as an obligation to his patients to place his practice above reproach, and to render a service which cannot be criticized from any standpoint:

To do what thy manhood bids thee do,
From none but self expect applause.
He noblest lives and noblest dies
Who makes and keeps his self-made laws.

The next order of business was a paper by Dr. W. O. Talbot, Biloxi, Miss., entitled "Clinical Experience and Observations in the Treatment of Pyorrhea Alveolaris," as follows:

Clinical Experience and Observations in the Treatment of Pyorrhea Alveolaris.

By W. O. TALBOT.

By way of introduction it is well to say that pyorrhea alveolaris is a term generally used, for want of a more correct one, as the name of a most common disease of the tissues surrounding the teeth. It is primarily a disease of the pericemental membrane, and in all of its stages and forms this membrane is the tissue most affected; hence the name pericementitis, with its qualifying adjectives indicating the symptoms or marked characteristics of the several forms of the disease, is most appropriate when discussing these forms. I will therefore use the terms "ptyalogenic calcic," "hematogenic calcic," and "phagedenic" pericementitis as the names most applicable to the three recognized distinct forms of the disease. As I propose to discuss the subject as a whole, using the distinct names only to refer to the three forms, I will define each and give its characteristic symptoms.

PTYALOGENIC CALCIC PERICEMENTITIS.

Ptyalogenic calcic pericementitis is that form of the disease which manifests itself first in a marginal gingivitis, acute or chronic, induced by some local irritant of a mechanic, chemic, or septic nature, augmented by a low vital resistance, temporary or prolonged, followed by a very hard, dark calcic deposit on the neck and root of the tooth. As the deposit increases or extends toward the apex of the tooth, the gum becomes hyperemic, swollen, and everted, and may be purplish in color. The pericementum is inflamed and is absorbed as the deposit proceeds, the alveolar process is absorbed at the margin, and the gum recedes. Infection takes place and there is suppuration and destruction of the pericementum, necrosis of the alveolar process, ulceration of the gums, and a discharge of fetid pus. The teeth may loosen and fall out or may have to be extracted. These conditions may occur on one tooth, on several, or on all the teeth in the mouth.

HEMATOGENIC CALCIC PERICEMENTITIS.

Hematogenic calcic pericementitis is that form of the disease which manifests itself in a dark calcic deposit on the roots of teeth, in a position not connected at first with the secretions of the oral cavity. The deposit, acting as a mechanical irritant, sets up an inflammation that usually results in an abscess and absorption of the alveolar process over the affected area. The abscess may point on the gum or discharge by the neck of the tooth, particularly in the upper arch. This form is believed to be due to the rheumatic or gouty condition of the system, which causes the calcic deposit to take place in the pericementum.

PHAGEDENIC PERICEMENTITIS.

Phagedenic pericementitis is that form of the disease that is characterized by

a progressive ulceration of the pericementum, beginning at the neck of the tooth and proceeding toward the apex of the root in narrow pockets, by a discharge of pus with the odor of caries of bone, and by disintegration of the overlying alveolar process, which leaves its margins rough and irregular. The tooth loosens, moves or rotates from the side affected, and in the latter stages becomes sore and elongated. The gum remains intact in the early stages, has a congested or bluish look, and if the acute form subsides, later recedes or ulcerates, exposing the surface of the root to the apex or as far as the process is destroyed. There may or may not be deposits on the root. The disease may attack one or several teeth in the mouth at the same time, usually bilaterally, though never all at once. This form is considered infectious, and it may be localized by taking hold of any inflamed area of the gum or pericemental membrane.

POINTS IN THE TREATMENT THAT ARE GENERALLY AGREED UPON.

The leading authors on pyorrhea alveolaris differ as to the immediate cause of the disease in its several forms, as to the *modus operandi* by which the manifestations are produced, as to the extent of the influence of systemic conditions upon its production, some claiming cause for effect and *vice versa;* but there are some common points in the treatment of the disease in each of its forms that seem to be agreed upon. They are (1) the removal of all irritants, (2) the frequent cleansing and disinfection of all pockets, (3) the local use of antiseptics and stimulating astringents, (4) the correction of all pathological conditions of the system in which the percentage of red blood corpuscles is below the normal, and (5) the correction of all systemic conditions that interfere with normal metabolism.

The first three of these points are strictly within the field of dentistry; the fourth and fifth are optional with the dentist. If he is sufficiently versed in the medical branches and wishes to treat these conditions it is within his province to do so, but few dentists indeed have had the proper training for such systemic work, and therefore, as a rule, it should be referred to a competent physician.

To the older practitioners of dentistry, who have treated pyorrhea alveolaris for years, it would perhaps be useless to describe or give the procedure in treatment of the several forms, but at the risk of tiring some of the "sages," and with the hope of having some of my own errors pointed out, at the same time giving some suggestions to those who have not traveled so far on this troublesome road, I will give some of the essential details of treatment.

DIAGNOSIS.

If a patient presents with a local or general marginal gingivitis, serumal calculus below the gum, and a history of several months' easy bleeding, the case is one of incipient ptyalogenic calcic pericementitis, and I would treat it as such.

At the first sitting, or before any work is done, the case is diagnosed. The form of the disease is determined, careful inquiry into the history of the case is made, and note taken of any systemic conditions that may be suspected of contributing to the cause, or that might operate as a barrier to the successful treatment of the case. If systemic conditions are

found or believed to exist which need correction and which the dentist is not wholly or positively capable of correcting, a competent physician is called into the case and the patient turned over to him for treatment. The habits of the patient are inquired into, and if there be anything that prevents the normal amount of sleep or of exercise in the open air, or if any other conditions appear that may keep up a nervous strain or lower the recuperative power and vigor of the patient, suggestions are given for their immediate correction.

PRELIMINARY STEPS IN TREATMENT.

Scaling. In beginning the treatment of any form of pyorrhea alveolaris, the first step is the removal of all heavy calcic deposits that are exposed on the crowns and roots of the teeth, thus cleansing the field and preparing for the more difficult part of the treatment. This can usually be done at one or two sittings with the large hoe and hooked scalers.

Cleaning of pus pockets. If there are pus pockets, every one should be syringed out with warm hydrogen dioxid at each sitting, beginning with the first and continuing through the treatment until there is no pus remaining in any of the pockets and until they have closed up.

Mouth toilet. At the first sitting the patient is instructed to use the dioxid three or four times a day. If there are pus pockets, the gums should be pressed with the fingers to eject the pus, and the mouth washed well with dioxid before meals, to prevent the pus from being incorporated with the food and carried into the stomach. A good portion of the time during the first few sittings is spent in instructing the patient in the technique of oral hygiene, and as to why it is necessary that each item be carried out, thus enlisting the hearty cooperation of the patient in the treatment and in oral hygiene during and after the treatment. The failure to so interest the patient at the proper time is the cause of many failures in treatment, makes dissatisfied patients, and establishes a belief that pyorrhea alveolaris cannot be cured in any form or at any stage.

IMMEDIATE LOCAL TREATMENT.

These preliminaries having been disposed of, the immediate local treatment should begin.

Selection of instruments. Before proceeding to operate, all instruments likely to be needed are placed conveniently and in order to be easily reached by the operator. Care and judgment should be exercised in the selection of the proper instruments to most skilfully and thoroughly execute the work in hand. This requires experience, for there are numerous sets of pyorrhea instruments on the market; all are constructed with various curves to suit the idea and convenience of their originator, and all are more or less confusing to the beginner. These are constructed as push, pull, and side movement instruments. The push instruments have the chisel form, the pull instruments the hoe form, and those for the side movements have the long spoon shape. Some operators use one kind, while others use all. I have found it necessary to use some of each form.

If any of the alveolar process is to be removed, small discoid points, chisels, and smooth fissure burs should be used.

Anesthetics in treatment of pus pockets. The pockets to be operated on are

syringed with warm hydrogen dioxid. If the pockets are shallow, an anesthetic is rubbed into the gums; if they are deep, a local anesthetic containing adrenalin chlorid is injected, as for extraction, around the teeth to be operated on at that sitting. The adrenalin prevents the excessive bleeding and gives a clear field for work. Some operators who treat this disease object to the injection of a local anesthetic on the ground that it consumes time and is unnecessary. This operation is a most painful one, in a field where anesthetics are usually effective, and as a first consideration, for the patient's sake an anesthetic should be used. As a second consideration, it allows the operator to proceed as rapidly as he can work, without the frequent if not constant protests of the patient, thereby enabling him to accomplish more in any fifteen to sixty minutes than could be done without the anesthetic. The tissue being anesthetized, the instrumentation is proceeded with as rapidly as is consistent with thorough, painstaking work, until all the deposits are removed from the roots, the roots scraped as smooth as possible over their entire denuded surfaces, the necrosed processes removed, and all jagged edges trimmed. It is a common mistake to leave deep pockets of long standing after cleansing the root without curetting all of the exposed surface of the process, which is always infected if not necrosed; therefore the surface is cut and freshened, and a clean surgical job made of each pocket.

Number of sittings, and teeth treated at one time. The number of teeth to be operated on at one sitting and the time of each sitting must be considered and must be suited to the strength and convenience of the patient as well as of the operator. My rule for sittings for the surgical work is one hour, the number of teeth one to four. This rule is varied according to the conditions met in each case. The sittings are given from two to three days apart for operating, and twice a week for treatment, after all the teeth have been gone over.

Disinfection and dressing of pus pockets. Immediately after operating, at each sitting the pockets operated on are syringed with warm hydrogen dioxid and wiped out with a weak solution of phenol-sulfonic acid, or a solution of lactic acid, cresol, and chloretone. This is applied on cotton wound on the end of a thin, pointed piece of orange-wood soaked in water or oil, and bent so as to be flexible. In some stubborn cases it is necessary to make several applications of the acid solution, but I do not allow it to remain in contact with the tissue more than half a minute. It is then washed out with water, and the pocket packed with sodium bicarbonate. The gums are then dried and painted with a solution of iodin crystals, zinc iodid, and glycerin, and allowed to dry.

A slightly astringent antiseptic mouthwash is prescribed to be used twice a day, the patient is dismissed, and given an appointment for two or three days later.

REMOVAL OF PULPS.

If there has been any great loss of pericementum and alveolar process and the teeth are very loose, as a rule the pulps are removed from such teeth and the roots filled. Particularly is this true when a splint or bridge work is to be used in connection with extreme cases. When the pulps are to be removed, this is done as early in the treatment as possible.

Gum massage. After all the operating

has been completed and the subsequent soreness has subsided, the patient is advised to massage the gums thoroughly once a day, preferably just before retiring. This is done to stimulate a healthy circulation and to toughen the gum tissue.

Massage paste. As an adjuvant to the physical treatment, I prescribe a massage paste that is slowly but entirely soluble, and which I have found to be most satisfactory to the patient and to myself. The formula is as follows:

Zinc sulfate,	gr. viij
Fluid red gum,	ʒj
Bicarbonate soda,	
Oil eucalyptus,	āā ʒss
Chloretone, inhalent,	ʒj
Vaselin (Alva), q. s. ad	℥j. M.

Extractions. One of the most difficult questions to decide in connection with any advanced case of pyorrhea is what condition of a tooth renders it advisable or necessary to extract. There is no positive rule applicable in all cases to determine extraction or retention, because teeth that are badly affected may be treated in some mouths and rendered serviceable for a reasonable time for a specific purpose, while in other mouths, under other conditions, such a procedure would not be advisable. It is, however, safe to advise the extraction of all teeth or roots affected with pyorrhea that have lost their entire alveolar support, and of those with a pus-eaten apex which have also lost the membrane from one-half their circumference for the length of the root.

AMPUTATION OF ROOTS.

There are cases with a pus-eaten apex, or with heavy deposits on the apex that cannot be successfully removed, in which the end of the root may be amputated and the tooth be made to give good service, provided more than half of the circumferential membrane and alveolar support is left.

Frequently cases present that require the exercise of a judgment that can only be gained by years of study and experience in the treatment of this disease. Whatever the conditions may be, I do not consider it advisable to preserve badly affected teeth or roots about which there is any question as to their reasonable serviceability.

SPLINTS.

There is a condition of extreme looseness of the teeth, associated with ptyalogenic calcic pericementitis, in which several of the teeth may be banded or joined together with a splint of some form and held firm. I prefer a splint with long pins, sunk into the teeth with connections cast on the pins in one piece from a wax form, or cast separately and soldered together and then cemented on. With this form, if any tooth in the splint should cause trouble, the end of the root can be cut off and the tooth allowed to remain in place in the splint.

In connecting the six anterior teeth the splint is confined to the lingual surface, so that it does not show. When it is used on the bicuspids and molars, the occluding surface is ground enough to get sufficient strength, and a V-shaped notch is ground into the approximal space to act as a brace for the splint.

BRIDGE WORK.

When teeth have been lost or have to be extracted in the treatment of pyorrhea, leaving only a few teeth or roots that can be put in a healthy condition,

some form of bridge work can nearly always be used. If the spans between abutments are not too long and the abutments not too weak, fixed bridge work can be used; but when the remaining attachment to the roots is weak or the span too long, or a distal abutment is missing, and when there has been great loss of tissue due to shrinkage, some form of removable bridge work will produce more permanent and satisfactory results. There are numerous ways of constructing removable bridge work, but I consider the system devised by Dr. H. T. Stewart of Greenville, Miss., which has been demonstrated at several Southern dental conventions, to be the most universally practical for extreme cases.

PARTIAL PLATES CONTRA-INDICATED.

I do not advocate the use of permanent partial plates of any form in pyorrheal cases when these plates are fitted closely about the necks of the remaining teeth, as rubber plates usually are—for the results are always disastrous to those teeth.

VIGILANCE IN CURED CASES.

When the pyorrhea has been cured, the mouth placed in a healthy condition again, and an ample masticating surface restored, the patient, when dismissed, must be assured that the price of a continued healthy condition is eternal vigilance and care on his part, together with frequent visits to the operator so that the mouth may be carefully watched.

BETTER TRAINING IN THE TREATMENT OF PYORRHEA NEEDED.

A word about the training of the profession in treating this disease would not be out of place. My observation has been that exceedingly few dentists attempt to treat pyorrhea. There is a woful lack of confidence on the part of the young graduate, even from our best colleges, to undertake such treatment, giving strong evidence of a lack of sufficient and proper training of these young men in the treatment of this dread disease from which the public is suffering and which is continually presented to every dentist. This disease is destroying more teeth in persons of between thirty and fifty years of age than caries, and yet how few dentists pretend to even give relief, and how many more are constantly proclaiming that this disease cannot be cured, and that nothing is left but extraction and plates.

It is time for the profession to wake up and meet the demands of the public that is clamoring for the treatment of this disease.

Discussion.

Dr. Howard T. Stewart, Memphis, Tenn. Dr. Talbot has long been known to us as an orthodontist and has frequently spoken on that subject before. A man who has given such long and extensive study to one particular branch of dentistry as Dr. Talbot has to orthodontia cannot be expected, generally speaking, to be equally capable in other branches. The essayist, however, seems to have been successful in all branches, and this paper, concise and to the point as it is, shows a practical knowledge of Riggs' disease that can come only with study and experience coupled with natural ability.

Nearly all of us differ as to minor points in the treatment of Riggs' disease, and some of us can accomplish results by one method, while our neighbor may ob-

tain his best results from methods which we cannot use. All this has to be taken into consideration while discussing so-called scientific methods. This is possibly true to a greater extent in the treatment of Riggs' disease than in any other part of dental practice.

Dr. Talbot has touched on a subject —the intelligent extraction of teeth in Riggs' disease cases—upon which I intended to write a paper for this meeting, which, however, owing to an unexpected emergency, I did not have time to prepare.

To decide which teeth should be extracted and *when* they should be extracted in Riggs' disease is by no means an easy task, yet nothing in the entire treatment is more important. I would go farther, a good deal, than Dr. Talbot, and say that while my life-work, almost, in dentistry has been to save teeth affected with Riggs' disease, the more I see of final results the more strongly I am convinced that extraction, generally speaking, should be resorted to where there exists a doubt.

I say, generally speaking. This statement may come as a surprise to those who have seen the very extensive bridge work that I have for years been placing on seemingly frail supports. I have used roots of teeth with little bony tissue about them to support very extensive bridge work, and have often been severely criticized for so doing, but the continued good service which the majority of these teeth are doing proves the efficiency of this plan when the tissue about the teeth is healthy and when they are properly braced against any lateral strain or tilting leverage; in other words, when nearly all the force is directed as a straight push of the root into its socket. When this can be attained it is marvelous what force such teeth can withstand, and how they grow firmer under it all the time. Yet I wish to call attention to the fact that these teeth are not to be used when there is still a suspicion that unhealthy tissue is present about them. If lateral strain can be overcome, it is safer to risk a root that has four-fifths of its bony tissue gone with the remaining tissue firm and healthy, than to risk one which has four-fifths of its tissue remaining but in an unhealthy condition.

If, in a case where all or nearly all the teeth are still in the arch—the majority of these being fairly tight yet several quite advanced, though not in the last stages—the patient believes that you can save his teeth, because he has been told that you are an expert, it requires a great deal of courage to advise the extraction of several of those teeth. The patient is shocked. He says, "Why, doctor, I thought you could save my teeth!" It is a very hard matter to answer this. The patient must have a good deal of confidence in you, then, to allow you to extract six or eight teeth and place in bridge work. It is a great temptation to try to save them all and put on splints.

The extraction of these teeth saves the patient the pain and annoyance of having these worst teeth operated on, and certainly has a salutary effect on the remainder of the teeth, greatly enhancing the chance for a permanent cure and giving the patient a far more satisfactory masticating apparatus by having bridge work solidly fastened to firm supports. Of course, no universal rule can be laid down, but when there are enough other teeth left to support bridge work firmly, doubtful teeth should almost invariably be extracted. It is certainly safer to err in this regard than to err by retaining

the doubtful teeth. After all, in this as in all else in dentistry, common sense is the greatest of all virtues.

The question of extraction from a practical standpoint is of the greatest interest to all dentists. Dr. Talbot has not expressed himself at length in regard to extraction, but I know from personal discussion with him that he is in accord with my views on this subject.

The paper is a good one and while it is not extensive, it comprehends much in a few words, and shows the same careful thought and thorough investigation that characterizes Dr. Talbot in all of his work.

The Clinic Committee, Dr. A. A. Dyer, Galveston, chairman, presented the following report:

Report of Clinic Committee.

By A. A. DYER, Chairman.

The Clinic Committee begs to report as follows: Owing to the fact that only one member of the committee was present at this meeting, a short outline of all clinics will be impossible at this time, but the chairman of this committee will endeavor to obtain from each clinician a concise report of the work done, and a short outline of the same for publication in the proceedings.

The following is a list of clinics given:

(1) "Porcelain Jacket Crown" (showing complete restoration of cutting edge of a central incisor), by Dr. Julian Smith, Austin, Texas.

(2) "Restoration of Porcelain Crown Without Removal of Pins." Also, "Attachment for Regulating Appliance," by Dr. B. G. Atlee, Monterey, Mexico.

(3) "Seamless Gold Crown by the Sharp System," by Dr. J. P. Tingle, Elgin, Texas.

(4) "Casting Backings for Steele's Facings," by Dr. A. B. Carter, Garland, Texas.

(5) "Casting Device," shown by Dr. H. Clay Hassell, Tuscaloosa, Ala.

(6) "Metal Lining on Waxable Vulcanite," by Dr. W. G. Mason, Tampa, Fla.

(7)—chair clinic—"Oral Prophylaxis," by Dr. W. H. Scherer, Houston, Texas.

(8) "Showing Casts in Orthodontia," by Dr. J. A. Gorman, New Orleans, La.

(9) "Appliance for Reduction of Fracture in Inferior Maxillary," by Dr. J. M. Murphy, Temple, Texas.

(10) "Plastic Gold," by Dr. C. L. Alexander, Charlotte, N. C. (This was one of the most interesting clinics given and deserves special mention for careful preparation.)

(11) "X-ray Photograph and Models" (showing missing teeth), by Dr. T. G. Bradford, Dallas, Texas.

(12) "Casting Process Applied to Gold Shell Crowns," by Dr. J. Frank Clark, Rogers, Texas.

(13)—chair clinic—"Preparation of Cavity for Porcelain Inlay," by Dr. J. P. Arnold, Galveston, Texas.

(14) "Method of Making a 'Better Fit' in Artificial Dentures," shown by Dr. Geo. S. Staples, Sherman, Texas.

This concludes the list of clinics. Dr. Robert Good of Chicago, with whom arrangements had been made for a clinic on pyorrhea, was unable to attend the meeting. Though thirty-five clinics had been promised and placed on the program, only fourteen were given. It seems as though the energies of the committee have been to a large extent spent in vain.

The committee desires to extend its thanks to those who furnished clinics, and also to Dr. Chace, the president, who was very active in giving able assistance to the committee.

A. A. Dyer, Galveston.
Chairman Clinic Committee.

The meeting then adjourned until the evening session.

FRIDAY—Evening Session.

The meeting was called to order at 8 o'clock Friday evening, May 6th, by the president, Dr. Chace.

The secretary *pro tem.*, Dr. W. G. Mason, read the minutes of the previous session, which were adopted as read.

The first item of the program as announced by the President was the reading of a paper by Dr. J. M. Weems, Sherman, Texas, entitled "Cleanliness in the Dental Office."

The paper here follows:

Cleanliness in the Dental Office.

By J. M. WEEMS.

On entering a dental office, the general appearance of neatness and cleanliness has great weight with your patients.

Your reception room should bear marks of gentility and have an atmosphere of cheerfulness, which to some extent may eliminate the dread that so many people have of a dental office; for it is probably of all places the last one to which people go as a matter of choice.

To do this, first, be careful in the selection of your wall paper. Avoid loud flashy colors; choose something that will be restful to the eyes and have a tendency to soothe disquieted nerves.

Second, let your furnishings be in keeping with your idea of repose. Hang a few choice pictures; scatter a few soft cushions. Supply your library table with late magazines, and last but not least, a few choice flowers, well arranged, are "emblematic of God's mercy" and a balm to some suffering soul.

Third, I should suggest a daily routine of dusting, of sterilizing instruments, and a change of doilies. The linen on

your chair should be spotless and well preserved. Have your rooms well lighted, radiant with sunshine—itself a germ-killer. Your cuspidor should be carefully cleaned and never bear marks of a previous operation, also be kept free from odors.

All soiled napkins and disease-laden cotton rolls should at once have a receptacle, and all instruments should be kept from view, except a few for immediate use, and these must be well cared for. The others must have their places and be in easy reach of the operator. Medicine bottles should be well corked and dusted, or, better, wiped with a damp cloth. What is more objectionable than an office scented with odors from carelessly corked bottles, or what is more exasperating than to have your fingers clogged with dust when trying to alleviate some pain?

Quite often a dentist's work is judged by his surroundings, therefore you had better get busy and wake up to the general condition of your office! I have gone to these places and found them in a filthy condition and have been startled by having this apology offered me: "I know my office is not as clean as it should be, but leaving these soiled napkins, strips, and pellets around makes the new patients believe that I have been very busy."

Poor ignorant fool! He is not aware that the surroundings indicate the man, and again, that the man and his patrons are influenced by his surroundings.

No dentist can afford to be slovenly, either in person or in habits about his office. He should give no one cause to question his regard for hygiene and asepsis. To guard against this, he should impress indelibly upon his mind a single word, and daily apply it to everything in and about his office; it should be his watchword ever and anon—*cleanliness!*

Fourth, and last, employ an office girl to assist you in these arduous duties. In many ways she will repay you. Some lady patients object to calling on a dentist who does not employ a lady assistant. Then, too, as a rule she will be more careful than a man about the appearance of your rooms; she will keep things sterile, and help to avoid a probability of inoculation.

We are servants of the public, we depend on the people for our existence, and we cannot command their respect unless we first respect ourselves. We cannot invite or control their patronage unless we maintain their confidence.

It was Dr. Osler who said, "You have one gospel to preach, and you have to preach it early and late, in season and out of season. It is the gospel of cleanliness of the mouth, of the teeth, and of the throat, and on these three things hangs the success of your life's work."

There is not one single thing more important to the public in the whole range of hygiene than "Oral Hygiene—The Hygiene of the Mouth."

The next order of business was the reading of a paper by Dr. J. O. Hall, Waco, Texas, entitled "Hot Water in Dentistry," as follows:

Hot Water in Dentistry.

By J. O. HALL.

Mr. President, and members of the Southern Branch of the National Dental Association.—I deem it a very great honor and privilege to appear before this great body of dental surgeons and try in a humble way to add my small mite to the vast and varied fund of knowledge which we as organized dentists have originated, or have fallen heir to from our forerunners—those grand old men of the profession who labored so long and earnestly to place dentistry upon the pedestal which it occupies today.

The dentist is handicapped somewhat in his seeking after scientific knowledge by the fact that he is ordinarily a hard-worked man, and as he becomes better fitted to give to the world his ideas and observations his work increases, until he is in a measure overwhelmed.

His working hours are taken up with nerve-sapping labor, which leaves him drained of energy when night comes, and his one thought and inclination is rest; study, to his tired body and overwrought nervous system, is out of the question.

The physician, lawyer, teacher, or scientist has more leisure time, as a rule, than the dentist, who must stick to his work in order to make ends meet, and that he may have something left for the proverbial "rainy day."

Belonging to this class of laboring men, I hesitated to present to this body any ideas of mine, for fear they would be of such little interest as to waste your valuable time—trying, however, at all times to give to my patrons the best of which I am capable.

I have made a few observations in regard to the use of hot water in dentistry that may be of interest. I make no claim to originality in these observations, except that possibly some few ideas in its application are suggested.

HOT WATER, STEAM, OR MOIST HEAT.

As antiphlogistic, anodyne, antipyretic, stimulant, counter-irritant, and cleansing agents these means have been used for centuries, long before the theory of their action was ever dreamed of.

The *hot poultice* of the good housewife and neighborhood nurse, with its thousand-and-one different ingredients, has been used for ages to alleviate suffering, and the merits of this, that, and the other agent lauded to the skies, while it was really the soothing, softening, and diffusing influence of the hot steam which brought ease and comfort to the sufferer. Have we as dentists discarded this valuable agent in the treatment of disease simply because it is too old and common? If we have, I suspect that our zeal for new and uncommon agencies has led us into error. Speaking of the theory of its action, have we any well-defined knowledge?

As a counter-irritant. I must confess that in my limited reading and study I have never found an article which threw much light upon this subject, hence my ideas relative thereto are necessarily guesswork to a certain extent. The first action of a hot application, as we all know, is to induce a hyperemia by drawing the blood to the surface and distend-

ing the parts. The capillaries are full, their walls relaxed, and the surface flushed. This results in a lessening of the tension in the underlying structures, relieving the congested area, and acting in the capacity of a counter-irritant.

As a diffusive stimulant. If the surface to which it is applied be greater in extent than the inflamed area, it further lessens the tension by drawing into healthy surrounding tissues a portion of the blood which ordinarily would have been directed to the seat of the inflammation; hence, in its application, I direct it upon as broad a surface as is possible or convenient. It is then acting as a local diffusive stimulant.

As an antipyretic. As it evaporates, and the surface assumes its more natural temperature, it absorbs heat from the inflamed tissues, and then acts as an antipyretic.

As an antiphlogistic. By relaxing and stretching the walls of the tiny vessels, it promotes diffusion and absorption, getting rid of the products of the inflammation by increasing the already large army of leucocytes and affording them an easier journey to their final haven of refuge where they may digest their meal of bacteria at their leisure. In this and all other actions moist heat is an antiphlogistic. So much for its first effects.

As is well known, its secondary action tends to deplete the parts by driving the blood out of the area to which it is applied; for example, the washerwoman's hands, which at first were red and full, finally become white and shrunken. This condition is, of course, impossible to obtain in a highly inflamed area, but it serves to illustrate the action which is taking place in the tissues.

As an anodyne and sedative. As to the anodyne properties of the poultice, any one of the above properties would of necessity reduce the pain, but moist heat exerts some subtle influence upon pain apart from the influence exerted by any or all of the foregoing actions, which I can only guess at by saying that it is a direct and powerful nerve sedative. A severe and obscure neuralgia, for instance, will often yield to an application over the affected area, of a hot pack which is changed at intervals as it cools. In this condition no inflammation exists anywhere near the region of its application, and it acts apparently only as a nerve sedative.

INDICATIONS FOR THE USE OF WARM WATER, AND THE MANNER OF ITS APPLICATION.

(1) Warm water should be used at the chair at all times during operations upon the teeth. It is more agreeable to the patient, and does not produce a shock if thrown upon a sensitive tooth.

Have you ever considered, in flushing out the mouth preparatory to making an examination, that a stream of cold water thrown upon a sensitive tooth will often occasion nervousness to the patient? Thus the operation is started under the most unfavorable circumstances. The patient begins to look for "bogies" at the outset, and the operator loses that perfect control and confidence so essential for his own as well as the patient's comfort during the operation. Having observed this fact, I use in the mouth nothing but warm water—unless when testing for a sensitive tooth—varying the temperature according to conditions. If there be considerable inflammation or a thick mucus, I use the water as hot as is comfortable, and always in combination with an antiseptic.

I use carbolic acid in from 1:500 to 1:250 solutions. If this happens to be disagreeable to the patient, I disguise the odor and taste with some one of the numerous available antiseptic solutions. Phenol solutions do not injure the instruments, and are borne better by the patient than anything I have tried.

I believe ordinary sanitary precaution demands that we begin all operations and examinations by first flushing out the mouth with a warm sterilized solution, taking a large pledget of cotton in the pliers, wiping about the teeth, then having the patient rinse his mouth thoroughly. This takes only half a minute, and is a natural and easy introduction to the real work. Patrons appreciate the extra trouble, for many of them have told me that their first favorable impression was due to this practice.

The germ theory has become common knowledge, and our patrons like to think that we are taking every precaution to protect them from the dangers of infection.

AFTER-PAIN FROM EXTRACTION.

This pain is hard to control and is often very severe, lasting from fifteen minutes to two hours after removing an abscessed tooth. This pain is produced, largely, by immediately releasing the pressure from an inflamed area; the nerves having adjusted themselves somewhat to the pressure will set up a protest when this pressure is instantly removed. We all know from experience that it hurts just as badly to suddenly release the pressure upon a mechanical separator as it does to suddenly put on that pressure. *Hot water*—as hot as it can be borne—is the only agent that I have found to control this pain. Immediately upon extracting an abscessed or infected tooth, I syringe out the socket two or three times with a hot carbolic solution; then, as soon as the hemorrhage begins to abate, I dismiss the patient from the operating chair, give him a cup of hot carbolized water, and direct him to hold a mouthful over the wounded gum until it begins to cool, then spit it out, and repeat. In about fifteen minutes the pain will usually abate. In this way I also save much time, as otherwise a patient will often sit and spit for half an hour and delay my work, making the next patient nervous and fretful at the delay. If I have taken out a number of teeth or an unusually bad one, I direct the patient to use hot water with listerine or some other wash three or four times a day, at home. This helps the healing process, and prevents infection of the blood-clot and dry sockets.

INFLAMMATORY CONDITIONS OF ERUPTING AND IMPACTED THIRD MOLARS.

No pathological condition in dental surgery has given me so much trouble as inflammatory conditions of erupting and impacted third molars, and in the early years of my practice I spent many uncomfortable hours contemplating the havoc which I had wrought in attempting to alleviate this condition. It has been my observation that less definite results are obtained in the treatment of this trouble than in that of any other. The whole burden is thrown upon nature, and in addition the inflammatory process is often aggravated by the usual treatment which obtains in these cases. This consists ordinarily in the indiscriminate lancing and cutting away of the overlying gum structures, then medicating more or less freely with the old

standby, aconite and iodin, and dismissing the sufferer with a prayer for his speedy recovery—the prayer being the better part of the treatment. This treatment is carried out by a large percentage of dentists regardless of the nature of the inflammation or the condition of the surrounding parts. I am firmly convinced that in nine cases out of ten the patient would have been better off if left alone. I should like to lay down a rule that no lancing or cutting away of the gum should ever be attempted while the inflammation is in the ascendancy—that is, before resolution has begun; all such work ought to be done after the inflammation has subsided, to prevent a recurrence of the attack. Lancing and cutting only add fuel to the flames. These parts by their anatomy are specially predisposed to inflammation. There is a natural pocket surrounding the advancing tooth, formed by the loose cellular and mucous tissue. In this pocket mucus and serum is constantly present, and any irritation is quickly followed by infection, and as there is an abundance of the best culture media, the inflammation is easily excited and spreads rapidly, often extending into the tonsils in a few hours.

As the gum tissue begins to swell. it closes in over the tooth more and more firmly, preventing any drainage of this natural pocket, with the result that an artificial pocket soon begins to form. It is to this point that we wish to direct our treatment.

I first direct a spray of hot water (carbolized) 1:250, to which I add absolute alcohol about 1:10. The alcohol seems to promote evaporation and consequent absorption of heat.

I continue this for two or three minutes, then saturate a mat of cotton of about the size of a twenty-five cent piece with the following solution:

℞—Campho-phénique,	ʒss
Cocain hyd.,	gr. x
Alcohol,	gtt. xx
or q. s. to make a clear solution	

and lay this over the inflamed area, directing the patient to close the mouth, while holding the cotton in position. While this is in place I arrange and sterilize probes. instruments, abscess syringe, etc. This usually occupies about five minutes. Next I remove the cotton and proceed to locate the focus of the inflammation.

The tissues are partially anesthetized, in order to render them less sensitive to exploration. About the best instrument for this purpose is the long curved excavator. This can be worked under the gum carefully, and passed down behind and to the side of the tooth cautiously, feeling the way until the pocket, which is nearly always deeper than one would suspect, is located. Upon removing it with an excavating movement, a thick cheese-like pus is often brought to the surface. The removal of the instrument will be followed by a hemorrhage with particles of pus floating in it. After having in this way located the seat of the trouble the treatment is comparatively easy.

A large abscess syringe, or other syringe to which a small curved point can be attached, is filled about half-full of the hot-water solution, then the rest with hydrogen dioxid. This imparts to the hydrogen dioxid the proper temperature. and dilutes it so as to prevent its too vigorous action. The explorer is then reintroduced into the pocket, and the gum gently pushed back to form a vent or exit for the blood, pus, and syringing solution. The point of the syringe is

then introduced into the pocket, and the solution at first gently forced into it. Care should be exercised in forcing any solution into an inflamed area or pus pocket, more especially hydrogen dioxid, as it does not take kindly to confinement, and will seek to escape in almost any direction except the right one, carrying the waste matter along with it and causing most excruciating pain. After the first syringing, the hot-water solution may be forced into the pocket somewhat more strongly, and the gum may be followed around, flushing it out thoroughly, removing the irritating serum and refuse particles, which almost invariably find lodgment between the tooth and gum. Then with a more powerful syringe the point between the second and third molars at either the bucco- or linguo-gingival line is located, and the solution is forced between them, flushing them out thoroughly. A secondary pocket is nearly always present at this point, but this having a natural vent, greater force may be used.

The operator is then ready for the hot-water spray again, which is applied for about five or ten minutes. Then some of the campho-phénique solution, or aconite and iodin, is introduced into the pocket and between the tooth and gums, working it down with a probe or some special applicating syringe. Then a mat of cotton saturated in the same solution is applied, and the patient is seated in another chair, holding the medicine in place for from ten to fifteen minutes. Usually the pain induced by the probing and syringing begins to abate in that time, and if so, you may feel assured that the patient will pass a comfortable night and resolution will be in progress by morning. If the case be a bad one, and the jaws are in such a condition that the parts cannot be thoroughly treated, I send the patient home to bed, prescribing a saline purgative and hot foot-bath, and directing that cloths be wrung out of hot water and placed over the jaw, face, and neck, and covered with a large towel to hold the steam in contact with the parts. These packs must be as hot as can be tolerated without blistering, and changed as they cool, continuing this for an hour if necessary, and repeating if the pain continues. If the patient be unable to sleep, a sedative is indicated, and I have found nothing so satisfactory as the following:

℞—Aspirin,	ʒss
Codein,	gr.jss

M. et ft. chart. no. vi.

Sig.—One every half-hour until relieved.

If the patient be a business man, or a stranger and unable to go home, I direct him to the barber, who applies the hot towels (as per instruction), and takes quite an interest in the treatment. This treatment will probably consume thirty minutes or so, but the patient will as a rule cheerfully compensate you for your time.

INCIPIENT ABSCESS.

The pain due to a developing abscess is difficult to treat, and often occasions the young dentist a vast amount of mental anguish and uncertainty. The first indication is to properly open up the affected tooth, cleanse the canals as thoroughly as possible, and flush them out with the hot-water solution. I do not attempt to clean out the entire root at first with a broach, for fear of forcing some of the detritus into the already infected apical space. I then pass a fine, smooth broach carefully through the

apical foramen to make a vent for the escape of the gases already formed and those to be formed. Forcing medicaments into the forming pocket only adds fuel to the flames, as they are in themselves irritating, and increase the already high tension of the parts. The hot-water spray is then directed upon the gums and continued for several minutes, alternating every minute or so with ice-water spray. The cold water reduces the tension immediately, affording temporary relief, and in conjunction these sprays promote speedy resolution, and often entirely abort the abscess. The hot pack is then applied by the assistant, or direction is given to use it at home, together with such other general treatment as the indications may call for. If, as sometimes happens, all treatment fails to give relief, the only possible measure is to hasten the formation and evacuation of the pus. In such a case the hot, moist poultice is the measure *par excellence,* as it hastens the formation of the pus and relaxes the tissues. Anything may be used to make the poultice—bran, flaxseed meal, corn meal, or the plain hot pack. In the last case, I should allow the poultice to become quite cool before replacing it, for as it cools it absorbs heat from the inflamed area. Some care must be used to prevent the abscess from pointing to the outside of the face. The patient is cautioned to discontinue the use of the poultice as soon as the pus breaks through the bone, which will be manifested by the rapid swelling of the soft tissues and a lessening of the pain. If this condition threatens, then the ice pack, applied over the focus of inflammation, will serve to drive the abscess back to the inside of the mouth, where it should be lanced.

CHRONIC OR AGGRAVATED GINGIVITIS.

This condition is a common one, and generally yields readily to the ordinary treatment of thoroughly removing the deposits of calculus, cleansing the teeth properly, and stimulating the gums with an astringent and counter-irritant. The hot spray and douche, however, are invaluable adjuncts, and hasten the healing process.

For cleansing the interproximal spaces and washing out the septic mucus, serum, and foreign particles, I have found nothing better than a strong syringe with a small point, which is placed between the teeth and between the gums and tooth if possible, the hot-water solution being forced into the space. This spray flushes and floats out the septic secretions and stimulates the gums to healthy activity. To my mind the greatest irritant in such catarrhal conditions is the mucus, which is secreted in superabundance and is broken up or decomposed in a very short time—it being an excellent culture medium, and becoming infected the moment it reaches the surface. I direct the patient to use an antiseptic mouth-wash in connection with the hot water several times a day, showing him how to rinse the mouth so as to force the solution between the teeth and gums.

The *modus operandi* is the same in the treatment of pyorrhea, with the necessary modifications to reach the pockets, and it greatly assists in the treatment of this troublesome disease.

I am indebted to Dr. J. Y. Crawford of Nashville, Tenn., for information concerning the treatment of various dental disorders by the use of Russian and Turkish baths, and while I believe these to be a great agent in the treatment of

pyorrhea, neuralgia, coryza, and inflammations generally, I have not, until recently, had access to the Russian bath in my home city, and have had no practical experience in its use. Any case of empyema or engorgement of the antrum of Highmore I shall certainly treat in this manner.

CONCLUSIONS.

In describing the use of hot water in the above conditions I have not attempted to present a general and full description of treatment, but only such portions as were necessary to bring out the use of hot water. I believe a more general use of this valuable agent will bring added comfort to our patients and satisfaction to ourselves. I was induced to make these remarks by my firm belief in its value, and because I see so few of my brethren taking advantage of it. I believe that, as members of the healing art, we should use every legitimate means for the welfare of our patients and the advancement of our profession.

The general practitioners of medicine have neglected a very valuable adjunct to their art, viz, massage, which in its proper application is a very valuable agent; and thus, owing to carelessness and disuse, an army of so-called osteopaths has sprung up all over the country, who claim everything and reap the reward which should rightfully belong to the M.D. Let us not through disuse lose the prestige and service which this great agent, hot water, affords us, if skilfully used.

The treasurer, Dr. BRABSON, then presented his report, which was referred to the Executive Committee for auditing.

Resolutions on Oral Hygiene.

Dr. JULIAN SMITH presented the following resolution:

RESOLVED, That we, the Southern Branch of the National Dental Association, indorse the work done by the Oral Hygiene Committee of the National Association, and record hereby our intention to give every possible assistance in the Oral Hygiene campaign.

The resolution was on motion adopted.

Dr. CORLEY, chairman of the Oral Hygiene Committee, then asked for donations from societies, resulting in the following amounts being pledged:

W. E. Walker—Louisana Society	$50.00
M. S. Merchant—Houston Society	35.00
R. W. Carroll—Houston Society	25.00
H. C. Hassell—Tuscaloosa Society	25.00
J. M. Murphy—Central Texas Society.	15.00
J. P. Corley—Alabama Society (add'l)	10.00
H. W. Lubben—Galveston Society	25.00
J. P. Corley—Oral Hygiene Committee	15.00

Dr. J. P. GRAY moved that the selection of the time and place of next meeting be left with the Executive Committee.

Motion carried.

ELECTION OF OFFICERS.

The election of officers for the ensuing year was the next order of business and resulted as follows:

President—Dr. H. C. Hassell, Tuscaloosa, Ala.

First Vice-president—Dr. W. H. Scherer, Houston, Texas.

Second Vice-president—Dr. J. D. Towner, Memphis, Tenn.

Third Vice-president—Dr. H. M. Davison, Hubbard, Texas.

Treasurer—Dr. B. D. Brabson, Knoxville, Tenn.

Corresponding Secretary—Dr. W. G. Mason, Tampa, Fla.

Recording Secretary—Dr. W. A. Dean, Tampa, Fla.

Executive Committee (two new members) —Dr. J. P. Gray, Dr. R. W. Carroll.

Dr. HASSELL, the president-elect, was then installed into office.

Dr. J. P. CORLEY moved that a rising vote of thanks be extended to Dr. Chace, the retiring president.

Motion carried.

Dr. CORLEY moved that the newspapers of the city be extended a vote of thanks for their courteous attention to the association during the meeting.

Motion carried.

Dr. CHACE moved that the Houston Dental Society be extended a vote of thanks for their royal entertainment of the association.

Motion carried.

Motion was then made and carried to adjourn until the next annual meeting.

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302 East 33th Street
New York